DRESSER NORWAY A.S.
MAGCOBAR

Statoil, 7121/7-1

SUMMARY AND RECOMMENDATONS

All in all this well was drilled with no major mud problems. The 36" and 26" holes were drilled and casing run at proposed depths.

The 17 ½" section is the only problem area. Fill was encountered on the wiper trips. Aslo it was necessary to make extra wiper trip when the Schlumberger logs would not go below 1330 m. After the trip, the well was logged and casing set with no further problems.

The 12 1/4" section was drilled to T.D. and logged and 9 5/8" casing set. The hole was tight during the coring operations, but appeared to be okay after a wiper trip through the interval.

The Gyp/Polymer mud functioned well with the type of formations drilled in this area. Frequent wiper trips, controlled drilling, and excessive circulation prior to trips also contribute greatly to stable well bore.

Experience on these wells show a dilution rate of 1 m^3 dilution per meter drilled in the 17 ½". This is needed to maintain the desired mud properties. The 12 1/4" was proportionally smaller in use. This dilution fluid was water with 2 ½ ppb Celpol and 4 - 6 ppb Gyp to maintain the proper concentrations.

With flowrates up to 900 GPM, the 80 and 100 mesh screens on the three Brandt shakers easily handled the flow. Cuttings showed good integrity and appeared to be easily seperated and never created a problem for blinding the shakers.

This well was drilled in 53 days from spud to testing to P. + A. The costs were within limits. This shows again the success of the Gyp/Celpol in this particular area.

DAILY MUD PROPERTIES

Well: 7121/7-1

Hole	1984 DATE	m DEPTH	WT.	VIS SEC.	CORR. 122°F PV	YP	GELS 122°F 0	10	pH BECK ☐ STRIP ☐	FLUID LOSS 100 PSI API 30min	500 PSI 300°F HT-HP	CL (X) CACL ☐ NACL ☐	ALKALINITY PF	PM	MF	CA ppm	RETORT % OIL	% SOL	% WATER	V.G. METER READING @ 122°C 600 R.P.M.	300 R.P.M.	200 R.P.M.	100 R.P.M.	6 R.P.M.	3 R.P.M.	LBS Bbl CEC	EXCESS GYP	TOTAL MUD COST
	11.6	419	1.07	100+																								9395.66
36"	12.6	421	1.06	100+																								11360.85
	13.6	419.5	1.07	100+																								17213.18
	14.6	415	1.07	100+																								17213.18
	14.6	415	1.05	41	6	21	13	13	10.0																			19891.37
	15.6	430	1.05	33	3	11	8	8	9.8																			20338.27
26"	16.6	706	1.07	34	5	18	13	13	9.7																			21259.64
	17.6	770	1.07	30	2	12	8	8	9.2																			24452.49
	18.6	770	1.07	30	2	10	5	6	9.5																			29003.86
	19.6	770	1.20	39	5	20	10	10	9.6																			35408.48
	20.6	770	1.20	39	3	18	5	5	9.6																			46446.39
	21.6	770	1.20	36	5	14	5	5	9.8																			61283.21
	22.6	770	1.10	60	13	14	2	2	10.0	18	-	400	.1	.2	.15	1800	-	4	96	40	27	18	10	2	1	< 5	4.1	73523.91
	23.6	835	1.10	50	14	18	2	2	10.0	7.0	-	4500	.05	.25	.05	2000	-	4	96	46	32	24	16	3	2	< 5	3.5	85094.93
	24.6	1045	1.15	59	18	20	2	3	9.2	4.5	-	5500	.05	.15	.1	1760	-	6	94	56	38	29	20	3	2	10	3.2	96436.98
17½"	25.6	1240	1.17	62	18	21	3	9	9.1	4.3	-	4000	.05	.15	.15	1960	-	8	92	57	39	30	20	3	2	16	3.2	103639.88
	26.6	1405	1.17	60	20	21	3	13	9.0	4.0	-	4000	TR	.1	.1	1960	-	8.5	91.5	61	41	32	21	3	2	18	3.6	116847.98
	27.6	1517	1.17	60	20	20	3	12	9.5	4.2	-	4000	TR	.25	.2	1600	-	9	91	60	40	31	20	3	2	18	3.2	125991.08
	28.6	1517	1.17	63	18	18	2	15	9.6	4.2	-	4000	TR	.15	.2	1800	-	9	91	54	36	28	18	3	2	18	2.8	129638.98
	29.6	1517	1.18	63	18	22	2	16	9.5	4.2	-	3500	TR	.15	.15	2000	-	9	91	58	40	30	20	3	2	20	2.6	132499.54
	30.6	1517	1.16	53	14	14	2	5	9.7	4.6	-	3500	TR	.15	.2	1800	-	8	92	42	28	20	15	3	2	16	2.4	134623.54
	01.7	1520	1.15	48	12	10	2	5	10.8	5.0	-	3000	.05	.6	.2	1600	-	7	93	34	22	18	12	3	2	17	2.4	134623.54
	02.6	1558	1.15	48	12	11	3	11	11.0	6.0	-	3500	.05	.4	.2	1600	-	7	93	35	23	17	10	3	2	17	3.0	140882.54
1/4"	03.6	1678	1.15	55	14	17	3	22	9.6	4.6	-	3500	.05	.35	.15	1800	-	7.5	92.5	45	31	25	17	3	2	17	2.6	152178.64
	04.6	1798	1.15	54	14	15	3	18	9.6	4.2	-	3500	.05	.2	.15	1800	-	7.5	92.5	43	29	23	15	3	2	17	3.0	157185.64
	05.6	1852	1.25	55	16	16	3	14	9.7	4.5	16	3500	.05	.25	.2	1760	-	11	89	48	32	25	16	3	2	16	2.4	161447.59
	06.6	1868	1.25	54	18	15	3	12	9.4	4.4	16	3900	.05	.19	.21	1800	-	10	90	51	33	25	16	3	2	16	2.5	167097.14
	07.6	1922	1.25	53	16	16	3	15	9.4	4.5	17		.0	.2	.2	1920	-	10	90	48	32	25	16	4	3	17		167913.59

DATE SPUD: 11.06.84

DATE T.D.:

COST:

DAILY MUD PROPERTIES

Well : 7121/-1

1984 DATE	m DEPTH	WT.	VIS SEC.	CORR. 122°F PV	YP	GELS 0	GELS 10	pH BECK ☒ STRIP ☐	FLUID LOSS 100 PSI API	FLUID LOSS 500 PSI 150°F HT-HP	CL ☒ CACL ☐ NACL ☐	ALKALINITY PF	PM	MF	CA ppm	RETORT % OIL	% SOL	% WATER	V.G. METER READING @ 122°F 600 R.P.M.	300 R.P.M.	200 R.P.M.	100 R.P.M.	6 R.P.M.	3 R.P.M.	lbs BBl CEC	EXCESS GYP (ppb)	TOTAL MUD COST	
8.7	1922	1.25	57	18	19	4	18	9.3	4.3	18	3900	.01	.2	.15	2000	-	10	90	55	37	28	19	5	3	19	3.0	172928.40	
9.7	1935	1.25	57	17	17	4	17	9.0	5.0	16	3800	.01	.15	.15	2000	-	11	89	51	34	25	16	4	3	20.5	2.8	174560.90	
10.7	1945	1.25	52	17	18	4	17	9.0	4.8	18	3800	.01	.05	.18	1920	-	10	90	52	35	26	18	5	4	20	2.6	176955.02	
11.7	1993	1.25	48	16	17	3	21	9.5	5.2	19	3850	.01	.05	0.1	1760	-	10.5	90.5	49	33	25	18	5	4	20	2.6	178619.12	
12.7	2108	1.25	47	16	21	7	31	9.0	5.6	19.5	3700	.01	.05	0.1	1720	-	11	89	53	37	30	22	8	6	19	2.9	182655.22	
13.7	2160	1.25	43	15	15	6	31	9.8	6.4	19	3700	.01	.15	.02	1680	-	10	90	45	30	25	17	5	4	19	2.8	183932.17	
14.7	2160	1.25	47	15	14	3	21	9.2	6.2	19	3700	.01	.13	.05	1680	-	10	90	44	29	24	16	3	2	19	2.8	183932.17	
15.7	2160	1.25	44	12	12	3	18	8.8	6.9	20	3700	.01	.05	.03	1720	-	10	90	36	24	19	13	3	2	19	2.6	183932.17	
16.7	2160	1.25	44	12	13	3	18	9.0	7.2	22	3800	.01	.05	.03	1720	-	10	90	37	25	19	12	3	2	19	2.4	184637.57	
17.7	2160	1.26	42	11	13	3	21	8.5	8.0	24	3800	.01	.03	.02	1800	-	11	89	35	24	19	13	3	2	19	2.3	186854.79	
18.7	2160	1.25	39	11	9	3	18	8.0	9.3	26	4100	TR	.02	.02	1560	-	10.5	89.5	31	20	16	10	3	2	17.5	-	186854.79	
19.7	2160	1.25	42	11	13	5	28	10.8	10.2	29	4300	.01	1.1	.05	1600	-	10	90	35	24	19	13	5	4	18	2.8	187758.99	
20.7	2160	1.26	41	11	11	3	23	10.8	10.3	29	4300	.01	1.0	.05	1600	-	10	90	33	22	17	12	3	2	18	2.8	188354.59	
21.7	2160	1.25	40	12	14	4	24	10.2	10.1	29	4600	.05	.8	.08	1560	-	10	90	38	26	21	16	4	3	18	-	188751.79	
22.7	2160	1.27	40	11	13	4	24	9.6	10.2	-	4800	.01	.15	.03	1640	-	11	89	35	24	19	13	4	3	19	-	189192.79	
23.7	2160	1.26	42	12	13	5	31	10.8	11.3	-	4800	.01	.75	.6	1560	-	11	89	35	24	18	12	4	3	19	-	191145.14	
24.7	2160	1.22	41	11	13	4	19	11.8	11.8	-	4800	0.4	1.7	1.0	1250	-	10	90	35	24	18	12	3	2	20	-	192885.39	
25.7	2160	1.22	41	11	13	3	19	12.0	15.6	-	4900	0.9	4.0	1.1	1360	-	10	90	35	24	17	11	3	2	20	-	196111.34	
26.7	2160	1.24	41	11	13	4	21	11.9	14.8	-	4900	0.8	3.7	1.1	1380	-	10	90	35	24	17	11	3	2	20	-	197725.22	
27.7	2160	1.24	41	11	12	4	20	11.8	14.8	-	4900	0.7	4.0	1.0	1370	-	10	90	34	23	16	10	4	2	20	-	197725.22	
28.7	2160	1.23	40	10	11	4	17	11.9	14.5	-	5000	0.4	3.5	1.0	1280	-	10	90	31	21	13	9	3	2	19	-	197725.22	
29.7	2160	1.25	43	11	12	3	16	11.8	12.1	-	5100	0.3	2.9	0.7	1100	-	8	92	34	23	17	12	3	2	18.5	-	201318.75	
30.7	2160	1.25	42	11	13	3	14	11.8	12.1	-	5100	0.3	2.8	0.7	1200	-	9	91	35	24	16	11	4	2	19	-	201318.75	
31.7	2160	1.25	45	11	12	3	15	11.9	11.7	-	5200	0.3	3.7	0.7	1050	-	9	91	-	-	-	-	-	-	19	-	201318.75	
1.8	2160	1.25	43	11	12	3	14	11.8	11.5	-	5200	0.4	3.4	0.8	1090	-	10	90	-	-	-	-	-	-	20	-	201318.75	
2.8	2160	1.25	40	11	12	3	14	11.5	11.8	-	5300	0.4	3.3	0.9	1100	-	10	90	-	-	-	-	-	-	20	-	202807.75	FINAL

DATE SPUD: 11.06.84

DATE T.D.: 13.07.84

COST:

DRESSER NORWAY A.S.

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Statoil, 7121/7-1

DAILY MATERIALS CONSUMPTION

DAILY MATERIALS CONSUMPTION

WELL 7121/7-1 PAGE 1

	DATE	DEPTH	BARITE	BENTONITE	CAUSTIC	SODA ASH	SPERSENE	CELPOL REG.	CELPOL SL.	GYPSUM	XCD POLYMER	DRISPAC REG.				DAILY MUD COST	REMARKS
	11.06	419	15	17	8	4										9395.66	Spud. Drill 17-1/2" pilot hole.
36"	12.06	421	7	2	3	2										1965.19	Pilot hole.Open up to 36".
	13.06	419.5	8	11	7	2										5852.23	Open up.Run 30" Csg.
	14.06	415	NO USAGE													0.0	Run,cmt.30" Csg.
	14.06	415		6	8	3										2678.19	Made mud for 26" section.
	15.06	430	3													446.70	Run riser.Drill cmt and shoe.Drill.
	16.06	706		2	5											921.37	Drill 12-1/4" pilot hole.
	17.06	770	21		3											3193.05	Drill.Log.Open hole to 26".
26"	18.06	770	12	6	12	1	2									4551.37	Open hole to 26".Mix 1.20 reserve mud.
	19.06	770	24	6	17	1										6404.62	Open hole to 26".Displace hole to 1.20
	20.06	770	46	10	4	1	1									11037.91	Wiper trip.Mix 1.20 mud.
	21.06	770	57	15	10	2										14836.82	Displ.hole.Run 20" cement csg.
	22.06	770	14		2			46		90						12240.70	Made gyp/polymer mud.
	23.06	835	20	2			6	29		28	4					11571.02	Displ. to gyp mud.Drill.
	24.06	1045	12		1		2	35		51	5					11342.05	Drill.
	25.06	1240			2			25	6	87						7202.90	Drill.
	26.06	1405	12		6			42	10	80						12208.10	Drill.
17-1/2"	27.06	1517	21					24		42	2					9143.10	Drill to csg.depth.
	28.06	1517	9					4		66	2					3647.90	Log.Wiper trip/log.
	29.06	1517	10		5	1		1								1820.56	Log.Wiper trip.Dilute kill mud.
	30.06	CASED							5							1040.00	Run.Cmt 13-3/8" csg.
	01.07	1520	4					5	2	11						2124.00	Drilled cmt.Leak off 1.42.
	02.07	1558	15	4	3	1		11		12						6259.00	Squeezed cmt.Drill cmt.Drill.
	03.07	1678	9					18	13	46	8					11296.10	Bit trip.Drill.
12-1/4"	04.07	1798	5		2			15		41		4				5007.00	Drill.Wiper trip.Drill.
	05.07	1852	7	4	2	1	1		1	10	3					4261.95	Drilled to coring depth.
	06.07	1868	35		1				2							5649.55	Coring.
	07.07	1922			1						2					816.45	Coring.
	08.07	1922	12	1	1		2		7	10	3					5014.81	Circ and clean.
	09.07	1935	8		2						1					1632.50	Coring.
	10.07	1945	5	2	2						2					2394.12	Coring.

DAILY MATERIALS CONSUMPTION

WELL 7121/7-1

PAGE 2

	DATE	DEPTH	BARITE M/T	BENTONITE M/T	CAUSTIC SXS	SODA ASH SXS	SPERSENE SXS	CELPOL REG. SXS	CELPOL SL SXS	GYPSUM SXS	XCD POLYMER	DRISPAC	BENTONITE SXS	SAPP SXS	BICARB SXS	DAILY MUD COST	REMARKS
	11.07	1993			4				7	11						1664.10	Drlg.
	12.07	2108			2		2		7	10	6					4036.10	Drlg.
	13.07	2160			5		17				2					1276.95	Drlg.to TD. Wiper trip.
12-1/4"	14.07	2160														0.0	Log.
	15.07	2160														0.0	Log.
Interval	16.07	2160	4		2		3									705.40	Run 9-5/8" csg.
	17.07	2160	9	2	2		1									2217.22	Run 9-5/8" csg.
	18.07	2160														0.0	Prepare to test well.
	19.07	2160			2		3				2					904.20	Prepare to test.Circ B/U.
	20.07	2160	4													595.60	" " "
	21.07	2160									1					397.20	Perforate and flow well.
	22.07	2160					2				1					441.00	Kill well. End test no.1.
	23.07	2160	5		1						2		19			1952.35	Top of test.Set cmt.
Test	24.07	2160					5				2			1		1740.25	Cmt.
	25.07	2160	5				7	5			3			1	2	3225.90	Drlg cmt.
Interval	26.07	2160		3							1					1613.88	Test no.2.
	27.07	2160														0.0	Test no.2.
	28.07	2160														0.0	Shut in.Kill well.
	29.07	2160	13	3	1		1				1					3593.53	Bull head.Rev.out.
	30.07	2160														0.0	P&A.
	31.07	2160														0.0	P&A.
	01.08	2160														0.0	P&A.
	02.08	2160														0.0	P&A.
	03.08	2160														0.0	P&A.Final.

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Statoil, 7121/7-1

MATERIALS CONSUMPTION BY INTERVAL

Interval 36"
17 ½" Pilot Hole drilled to 421 m and opened
up to 36" to 119.5 m.

PRODUCT	UNIT SIZE	UNIT COST	UNITS	COSTS
Barite	M/T	$ 148.90	30	$ 4467.00
Bentonite	M/T	405.56	30	12166.80
Caustic	25 kg	22.05	18	396.90
Soda Ash	50 kg	22.81	8	136.86

Total section cost: us $ 17213.18

Meters drilled: 69 m 17 ½" + 67 ½ m opening up = 136.50 m
Cost per meter: us $ 126.10
Mud made: 476 m^3
Usage: 351 m^3
Cost per m^3 us $ 36.16

Section cost includes the make up of stanby kill-mud. 57 m^3 at 1.23 RD and 68 m^3 pre-hydrated gel not used in section.

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Statoil, 7121/7-1

MATERIAL CONSUMPTION BY INTERVAL

Interval 12 1/4" Pilot Hole 421 - 770 m
Interval 26" Hole 421 - 764 m

PRODUCT	UNIT SIZE	UNIT	UNIT COST	COST
Barite	MT	163	$ 148.90	$ 24,270.70
Bentonite	MT	45	$ 405.56	$ 18,250.20
Caustic Soda	25 kg/sx	59	$ 22.05	$ 1,300.95
Soda Ash	50 kg/sx	8	$ 22.81	$ 182.48
Spersene	25 kg/sx	3	$ 21.90	$ 65.70
			Total cost:	$ 44,070.03

Meters drilled: 12 1/4" - 349 m
26" - 343 m

Total: 692 m
Cost per meter: $ 63.69

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Statoil, 7121/7-1

MATERIAL CONSUMPTION BY INTERVAL

17 ½" from 770 - 1517 m

PRODUCT	UNIT SIZE	UNIT COST	UNITS	COST
Barite	M/T	$ 148.90	98	$ 14592.20
Bentonite	M/T	405.56	2	811.12
Caustic	25 kg	22.05	16	352.80
Soda Ash	50 kg	22.81	1	22.81
Gypsum	40 kg	10.90	444	4839.60
Celpol Reg.	25 kg	198.50	206	40891.00
Celpol SL	25 kg	208.00	21	4368.00
XCD-Polymer	50 lbs	397.20	13	5163.60
Spersene	25 kg	21.90	8	175.20

Total section cost: $ 71216.33

Meters drilled: 747 m

Cost per meter: us $ 95.34

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Statoil, 7121/7-1

MATERIAL CONSUMPTION BY INTERVAL

12 1/4" from 1517 to 2160 m

(Not including testing and P+A costs)

PRODUCT	UNIT SIZE	UNIT COST	UNITS	COSTS
Barite	M/T	$ 148.90	113	$ 16825.70
Bentonite	M/T	405.56	13	5272.28
Caustic Soda	25 kg	22.05	29	639.45
Soda Ash	50 kg	22.81	2	45.62
Gypsum	40 kg	10.90	151	1645.90
Celpol Regular	25 kg	198.50	49	9726.50
Celpol SL	25 kg	208.00	39	8112.00
Drispac Reg.	25 kg	198.50	4	794.00
XCD Polymer	50 lbs	397.20	27	10724.00
Spersene	25 kg	21.90	26	569.40
		Total cost:		$ 54355.25

Total cost: $ 54355.25

Per meter : $ 84.93

Meters drilled: 640 m

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Statoil, 7121/7-1

MATERIAL CONSUMPTION BY INTERVAL

Interval, Testing and P. + A.

PRODUCT	UNIT SIZE	UNIT COST	UNITS	COST
Barite	MT	$ 148.90	27	$ 4020.30
Bentonite	MT	405.56	7	2838.92
Caustic	25 kg	22.05	4	88.20
Spersene	25 kg	21.90	18	394.20
Celpol (Reg)	25 kg	198.50	5	992.50
XCD Polymer	50 lbs	397.20	13	5163.60
Sapp	50 kg	91.85	2	183.70
Bicarb	50 kg	26.10	2	52.20
				$ 13733.62

5.2 RFT summary

Objectives

Two RFT runs were performed as a part of the final logging program over the reservoir section in order to:

1. Confirm core and log interpretation.
2. Confirm estimated gas-fluid contact.
3. Indicator of formation pressure and permeability.
4. Obtain fluid samples.

Pretests

Two RFT runs were performed 15 July 1984. On the first RFT-run 25 pretest pressure points were obtained in the hydrocarbon zone. In the second run a sample was obtained.

PRETEST RECORDED DATA

Well: 7121/7-1

Date: 14.7.84

Run no.: 1

Test	Depth	Temp.	Cor.Formation Pressure	Remarks
No.	m RKB	°C	kPa, g/cc	
8	1851.0	52.78	20.813.20/1.147	Fair
11	1857.0	53.33	20.813.20/1.143	Fair
17	1865.0	53.33	20.840.78/1.140	Fair
20	1867.5	53.89	20.847.68/1.139	Fair
23	1872.5	53.89	20.854.57/1.136	Fair/Poor
26	1881.0	54.44	20.861.47/1.131	Fair/Poor
29	1885.5	54.44	20.868.36/1.129	Fair/Poor
32	1890.0	55.00	20.882.15/1.127	Fair
35	1895.8	55.00	-	Poor-Superchanged
38	1900.0	55.56	20.889.05/1.121	Very good
42	1903.5	55.56	20.902.84/1.120	Very good
44	1909.5	56.11	20.978.68/1.121	Very good
47	1914.0	56.67	21.026.94/1.121	Good
50	1926.2	56.67	21.151.05/1.120	Good
53	1937.0	57.22	21.254.47/1.119	Fair/Good
56	1946.2	57.78	21.350.99/1.119	Poor/Fair
59	1949.8	58.33	21.392.36/1.119	Good
62	1953.2	58.89	21.433.73/1.119	Very good/Excellent
65	1958.0	58.89	21.475.10/1.119	Very good/Excellent
68	1985.2	59.44	21.764.68/1.118	Poor/Fair
71	1999.8	60.00	21.923.26/1.118	Excellent
74	2014.0	60.56	22.068.05/1.118	Good
77	2022.0	60.56	22.150.79/1.117	Fair
80	2032.4	61.11	22.268.00/1.118	Very good/Excellent
83	2059.9	61.67	22.543.70/1.116	Fair

Sampling

Two segregated samples were taken one on each run, at 1900.2 m RKB and at 1851.0 m RKB respectively.

The sample taken at 1900.2 m RKB confirmed gas to be present (see sampling data) and ensure that the gas/water contact was not reached. The 2-3/4 gallon chamer was bled off offshore and gave a opening pressure at 2220 psig. The sample contained 58.25 cuft of gas and 1 litre of liquid consisting of 800 cc water/mud filtrate and 200 cc condensate. The sample was transferred from the chanber to a sample bottle at core lab., Agotnes. The opening pressure was 2259.50 psig, containing gas and water/mud filtrate.

The sample taken at 1850.5 m RKB was an attempt to prove mocalbe hydrocarbons to be present at the top of the gas zone from the logs. The 2 3/4 gallon chamer contained 2200 psig with 4500 cc water based liquid, a small volume condensate and 41 cuft of gas. The 1 gallon chamber was transferred onshore and had an opening pressure of 2050.6 psig with 0.745 litre of mud filtrate/water and 29.59 litre og gas.

Sample no. 1 at 1900.2 m RKB

Recovery in the 2 3/4" gallon chamber

Opening pressure: 2234.7 psia
Gas : 58.25 cuft

1 litre liquid consists of

Water based material: 800 cc
Condensate : 200 cc

COMPARISON OF COMPOSITION BETWEEN RFT CONTENT AND PVT SAMPLES (RECOMBINED):

Mol%	Sample at 1900.2 m	PVT sample DST no. 2
Carbondioxide	6.27	6.71
Nitrogen	3.30	3.01
Methane	79.40	80.52
Ethane	5.11	5.07
Propane	3.09	2.27
I-Butane	0.40	0.33
H-Butane	0.75	0.67
I-Pentane	0.25	0.21
N-Pentane	0.23	0.23
Hexanes	0.40	0.20
Heptanes	0.36	0.22
Octanes	0.16	0.19
Nonanes	0.12	0.11
Decanes plus	0.16	0.25
	100.00	100.00

Mol weight liquid: 114 (c7 +) 109.1 (sep. liquid)

Calc. gas gravity: 0.746 0.734

Sample no. 2 at 1850.5 m RKB

Recovery in the 2 3%4 gallon chamber:

Opening pressure : 2214.7 psia
Gas : 41.0 cuft
Water based liqid: 4500.0 cc

COMPARISON OF COMPOSITION BETWEEN RFT CONTENT AND PVT SAMPLES (RECOMBINED):

Mol%	Sample at 1850.5 m	PVT sample DST No. 2
Carbondioxide	5.83	6.71
Nitrogen	3.17	3.01
Methane	80.62	80.52
Ethane	5.16	5.07
Propane	2.27	2.27
I-Butane	0.41	0.33
H-Butane	0.79	0.67
I-Pentane	0.22	0.21
N-Pentane	0.29	0.23
Hexanes	0.44	0.20
Heptanes	0.36	0.22
Octanes	0.15	0.19
Nonanes	0.12	0.11
Decanes Plus	0.17	0.25
	100.00	100.00

Mol weight liquid: 113 (c7 +) 109.1 (sep. liquid)

Calc. gas gravity: 0.736 0.734

TEST SUMMARY

DST no.	Perforated interval m RKB	BHP kPa	BHT deg.C	k um^2	skin
1	1950-1960	21180	67.2	0.118	-2
2	1867-1872	20743	61	0.065	40

Reservoir properties from logs and core

Interval m RKB	Porosity %	Watersaturation %
1950-1960	20.9	100
1867-1872	18.1	19.7

DST NO. 1

Objectives

* Formation water samples for analysis.

* Determination of permeability in water zone compared with core measurements.

* Pressure and temperature measurements.

Test String

A standard 5" test string comprising RTTS packer, LPR-tester valve, APR-M circulating valve plus drill pipe tester valve was run.

Perforation was performed underbalanced using tubing conveyed perforation with a shot density of 12 shots per foot. Diesel was used as a cushion.

Three MK-3A and two SSDR gauges were used to record bottom hole pressure and temperature.

Test operation

The test was successfully performed and the test objectives were fulfilled.

The two SSDR gauges were run on a gauge carrier below the perforation guns. The whole carrier fell of during the test and was left in the hole. Accordingly were no data obtained from the two SSDR gauges. A possible explanation of the gauge carrier misrun is that the connection between the hanger and the string was to weak and did not have the strength to resist the chock when firing the perforation guns.

Good data were obtained from the three MK-3 gauges. These gauges were run in a bundle carrier above the perforation guns. Sensing depth for the MK-3A gauges are 1934.75 m RKB.

DST no. 1 - Summary

Perforated interval: 1947.2-1960.18 m RKB.

Flow period	Duration min.	WHP kPa	WHT C.	BHP kPa	BHT C.	Rate m^3/D	Choke mm.
Flow	576	2970	36.1	20370	70.1	471.4	fully open
Build-up	825	1190		21180	66.2		50.8+ 44.5

Water analysis

During the water test analysis of production water were performed by Petrotech A/S. Chlorides and pH were measured.

Results:

Cl = 66907.7 ppm (equals 110400 ppm NaCl)

Ph = 6.05

DST NO. 2

Objectives

* Determine productivity of the perforated zone.
* Determination of permeability.
* Receive good reservoir fluid samples.
* Pressure and temperature measurements.

Test string

A standard 5" test string comprising RTTS packer, LPR-tester valve, APR-M circulating valve plus drill pipe tester valve was run.

Test operation

The test was successfully performed and the test objectives were fulfilled.

Perforation was done underbalanced using tubing conveyed perforation with a shot density of 12 shots per foot. Drillwater was used as a cushion.

Data were obtained from the three MK-3 gauges and one SSDR. Gauge no. 0181 suffered a head failure after the end of the test. Gauge n0. 0191 temperature sensor reading 10^{o} F high. Gauge no. 0108 not operating prior to fire the guns, but came in okay immediately following shock of perforating. The MK-3A gauge no. 0108 was used in the analysis.

Summary

Perforated interval: 1867-1872 m RKB.

Flow period	Duration min.	WHP kPa	WHT C.	BHP kPa	BHT C.	Rate m^3/D	Choke mm.
Flow	1035	10131	23.9	13971	55.7	501	19.05 on
Build-	795	96010	15.6	207431	61.0		heater

DST no. 2, PVT-analysis

Three sets of PVT-samples was taken (1 set = 2 gas and 1 condensate bottle) from the separator. At the present time a full PVT analysis is no ready.

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REPORT TYPE		
	REPORT NO. IFE/KR/F-85/015	DATE 1985-02-05
	REPORT TITLE REPORT ON STABLE ISTOPES ($\delta^{13}C$ and δD) ON A NATURAL GAS FROM WELL 7121/7-1, 1866 - 1871 M	DATE OF LAST REV.
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	CLIENT Den norske stats oljeselskap a.s	NUMBER OF PAGES 2
	CLIENT REF.	NUMBER OF ISSUES

SUMMARY

The gas components CH_4, C_2H_6, C_3H_8, i-C_4H_{10}, n-C_4H_{10} and CO_2 have been separated from the natural gas of well 7121/7-1, and the $\delta^{13}C$ values of these components have been measured. The isotopic composition of hydrogen which was made from the H_2O during the combustion of CH_4 have also been measured.

The carbon isotopic distribution between the hydrocarbon gas components methane, ethane, propane and n-butane indicates together with the combined use of the carbon and hydrogen isotopic composition of methane that the gas was formed at a relatively high maturity in the oil window.

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T A B L E   O F   C O N T E N T S

1 ANALYTICAL PROCEDURE

The natural gas has been separated into the different gas components by a Carlo-Erba 4200 instrument. The hydrocarbon gas components were oxidized in separate CuO ovens, which enable us to collect several times when the concentration of a gas component is low. The combustion products CO_2 and H_2O were frozen into collection vessels and separated. The isotopic measurements were performed on a Finnigan Mat 251 mass spectrometer. Our $\delta^{13}C$-value on NBS-22 is -29.77 +/- .06 o/oo.

2 RESULTS

The results of the isotope determinations are given in the following table:

Table 1

C_1						CO_2	
$\delta^{13}C$	δD	$\delta^{13}C_2$	$\delta^{13}C_3$	$\delta^{13}C_{i4}$	$\delta^{13}C_{n4}$	$\delta^{13}C$	$\delta^{18}O$
-45.2	-175.2	-32.7	-31.2	-25.0	-29.2	-8.9	-11.1

Our uncertainty on the $\delta^{13}C$ value is estimated to be ± .3 o/oo, and includes all the different analysis steps.

The uncertainty on the δD value is likewise estimated to be ± 5 o/oo.

The composition in % of the gas sample is given in Table 2. The results have not been normalized to 100%. The rest is air.

Table 2: Composition of the gas from well 7121/7-1

C_1	29%
C_2	4.1%
C_3	1.8%
i C_4	0.30%
n C_4	0.61%
CO_2	6.1%

3 INTERPRETATION

THE $\delta^{13}C$ values of methane, ethane, propane and n-butane have been plotted on the maturation diagram by James (1983)*, Figure 1. A source LOM between 11 and 12, e.g. to a vitrinite reflectance of about 1.1 is indicated.

The carbon and hydrogen isotopic composition have been plotted in a $\delta^{13}C$ methane vs. δD methane cross plot (Schoell 1983)**, Figure 2. this also indicates that the gas was formed at a relatively high maturity of the oil window..

4 CONCLUSION

The carbon isotopic distribution between the hydrocarbon gas components methane, ethane, propane and n-butane indicates together with combined use of the carbon and hydrogen isotopic composition of methane that the gas was formed at a relatively high maturity in the oil window.

* James, Alan T. (1983): Correlation of Natural Gas by Use of Carbon Isotopic Distribution Between Hydrocarbon Components, A.A.P.G. Vol. 67, No. 7, July 1983.

** Schoell, M. (1983): Genetic Characterization of Natural Gases A.A.P.G. December 1983.

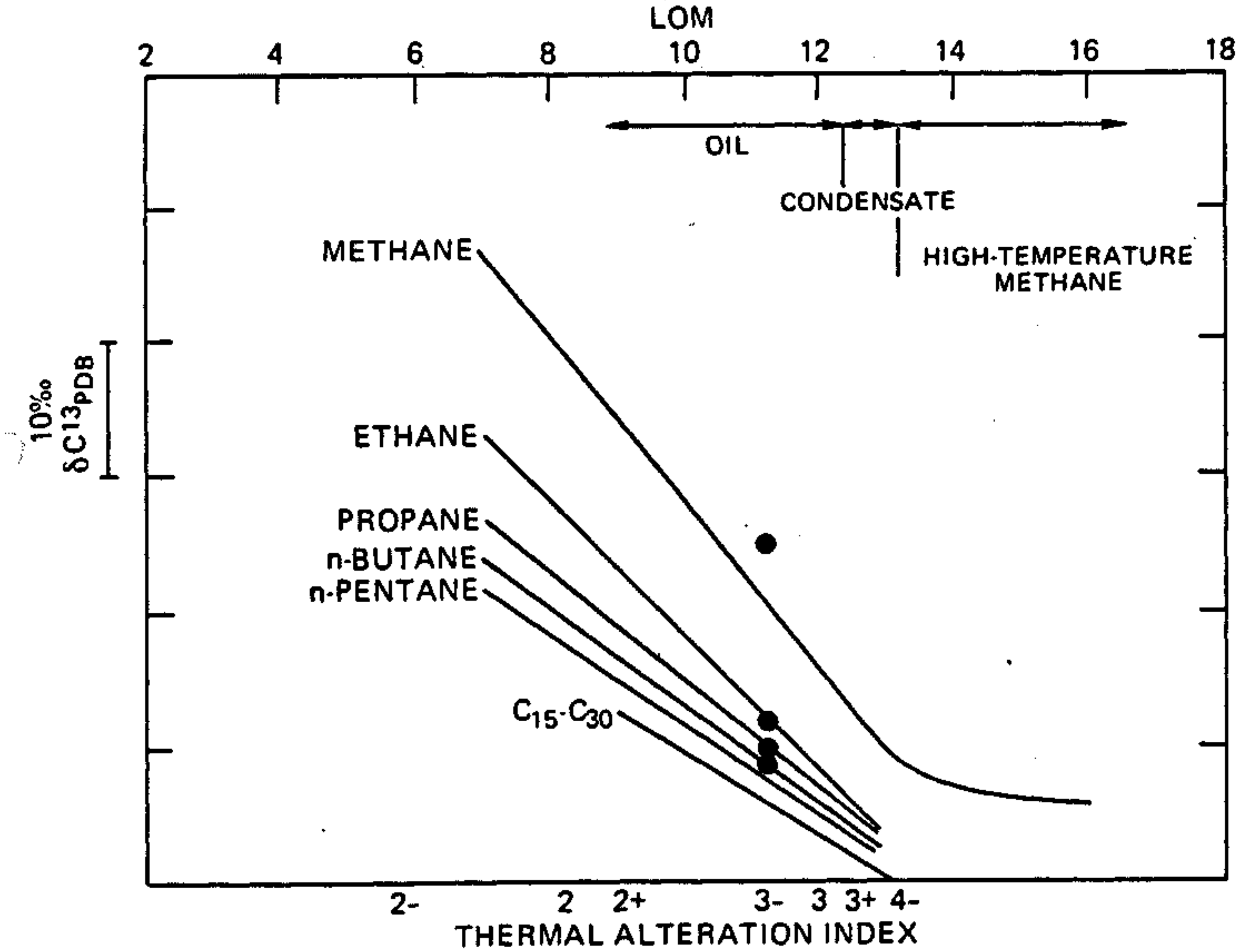

Figure 1. Carbon isotopic separations of the gas from well 7121/7-1 are plotted on the maturity diagram (after James, 1983). A source LOM between 11 and 12 is indicated for the gas.

The calculated carbon isotopic separations between gas component are plotted on the vertical axis using a sliding scale that is simply the algebraic difference, in parts per mil, between the isotopic compositions of the natural gas components. The scale does not possess a fixed origin, but is oriented with the more depleted $\delta^{13}C$ values at the upper end. Use of this sliding scale allows the maturity of a gas to be assessed without prior knowledge of the isotopic composition of the gas source.

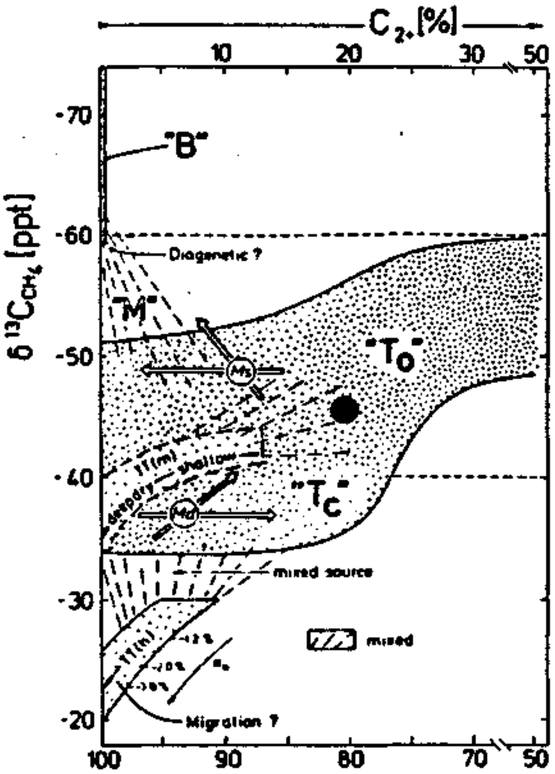

Figure 2 a. Variations of molecular composition in natural gases related to the isotope variations of methane.

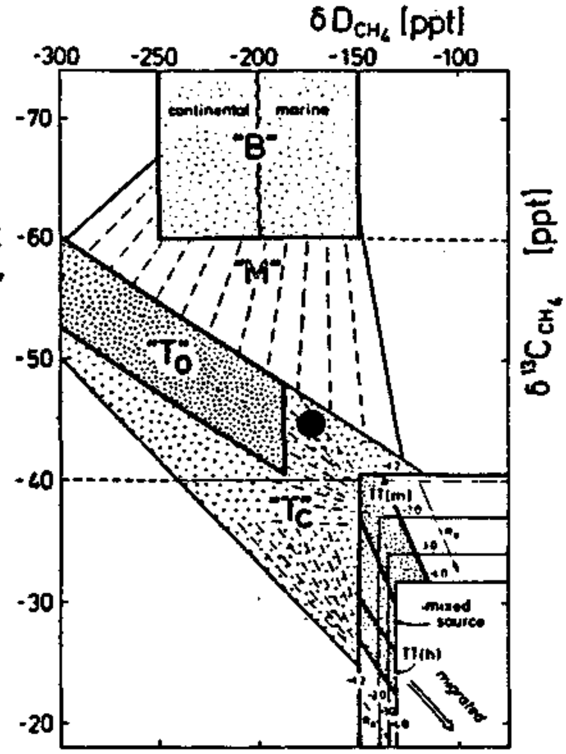

Figure 2 b. Carbon and hydrogen isotope variations in methanes.

The principle for the genetic characterization of natural gases is that the primary gases (B-biogenic gas, T-associated gas, TT-non-associated gas) are defined by fields of compositional variations. These primary gases may become mixed and form various mixtures "M" of intermediate composition. "TT(m)" and "TT(h)" are non associated gases from marine source rocks and coal gases from N.W. Germany, respectively, compositional shifts due to migration are indicated by arrows Md (deep migration) and Ms (shallow migration), respectively. "T" are gases associated with petroleum in an initial phase of formation. "T_C" are gases associated with condensates. (Schoell, 1983).

3/

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REPORT TITLE/ TITTEL

Source rock evaluation of well 7121/7-1.
Contract T-4533, Job. no. 2.

CLIENT/ OPPDRAGSGIVER

Statoil

RESPONSIBLE SCIENTIST/ PROSJEKTANSVARLIG

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SUMMARY/ SAMMENDRAG

BA-84-6023

Summary, see next page.

KEY WORDS/ STIKKORD

Source Rock	Evaluation
Potential	Maturity

SUMMARY

The analysed sequence, 825-2160m was divided into 6 zones mainly based upon the lithology.

Zone A; 825-1470m:
Consists mostly of medium dark grey-dark grey, silty claystones with poor TOC values. Kerogen type III and IV is present with a poor potential for gas. Immature to moderate mature.

Zone B; 1485-1770m:
Dark grey claystones with fair to good TOC values are dominant. Same kerogen type as above with a poor to fair potential for gas. Moderate mature-early mature.

Zone C; 1785-1860m:
(Corresponds roughly to Upper Jurassic). Consist of TOC-rich dark brownish black claystones. A type II and a mixed type II/III kerogen with a good-rich potential for oil and gas. Early mature.

Zone D; 1860-1935m:
Various grey-coloured claystones. In the dark grey claystones with rich TOC values a type III kerogen with a fair to good potential for gas is present. The medium dark grey claystones with a type IV kerogen have a poor to fair potential for gas. Mature.

Zone E; 1935-2085m:
Sandstone is the dominant lithology with minor claystones and small amounts of coal. A type III/II kerogen with a good-rich potential for gas and condensate and possibly waxy oil. Mature to oil window mature.

Zone F; 2085-2160:
The medium dark grey-dark grey, silty claystones interbedded with sand show fair to good TOC values. A type III kerogen with a fair potential for gas is present. Oil window mature.

CONTENTS

CONTENTS continued Page

FIGURES

1. INTRODUCTION

This report presents a geochemical evaluation of the section between 825m and 2160m in well 7121/7-1 from Tromsøflaket.

The samples received for analysis were as follows:

- 116 canned (1 litre) cuttings samples.
- 57 sidewall cores (swc).

The cuttings samples were taken at intervals of 15 metres. The samples were assigned the IKU job number 05.1747.00 and were carried out according to the terms of the open contract T-4533, Job. no. 2 from Statoil. The samples were of generally good quality, however cement from casing point contaminated the sample at 1515-1530m.

IKU were instructed to screen the samples by gas analysis, lithological description, total organic carbon and Rock-Eval pyrolysis. A maximum number of each analysis was quoted for each screening technique used.

These were as follows:

- C_1-C_7 gas analysis : 50 analyses.
- Lithological description: 50 analyses.
- Total organic carbon: 80 analyses.
- Rock-Eval pyrolysis: 70 analyses.

In the event, 50 C_1-C_7 gas analyses were performed and analysed according to instruction from Statoil, 1 can every 30m from 1000m to 1793m and 1 can every 15m from 1793m to T.D., 50 lithological descriptions of cuttings samples and later 37 brief lithological descriptions on sidewall cores, 83 total organic carbon analyses (46 cuttings and 37 sidewall cores) and 67 Rock-Eval analyses (44 cuttings and 23 sidewall cores).

Based on the results of the screening analysis Statoil selected the samples to be used for the follow-up analysis.

The follow-up analysis was as follows:

-	Visual kerogen analysis	20
-	Vitrinite reflectance	20
-	Pyrolysis-gas chromatography	10
-	Extraction, MPLC separation of saturated and aromatic hydrocarbons	10
-	Gas chromatography of saturated hydrocarbons	10
-	Gas chromatography of aromatic hydrocarbons (calculation of MPI)	10
-	GC-MS biomarkers	10
-	$\delta^{13}C$ carbon isotope analysis	10

Visual kerogen and vitrinite reflectance analysis were performed on 20 sidewall cores which were especially marked by Statoil.

Five samples (5 saturated and 5 aromatic hydrocarbons) were chosen according to weight for GC-MS and $\delta^{13}C$ isotope analysis.

2. EXPERIMENTAL METHODS AND DESCRIPTION OF INTERPRETATION LEVELS

2.1 Gas analyses

The cans were thawed out overnight. A septum was attached to the can, a sample of the headspace gas was taken and analysed for C_1, C_2, C_3, i-C_4, nC_4 and C_5+ (conditions: see below).

The can was opened, headspace volume, water volume and sample weight were measured. The canned samples were washed with temperated water on 4, 2 and 0.125 mm sieves to remove drilling mud and thereafter dried at 35°C.

For occluded gas analysis an aliquot of the 2-4 mm fraction of each sample before drying was crushed in water using an airtight ball mill. The evolved gas was analysed as described for headspace gas.

GC conditions:

C_1-C_5+ analysis

This analysis was performed on Carlo Erba Fractovap 2150 and 2350 gas chromatographs equipped with 2m x 1/8" stainless steel columns filled with Porapack Q on Chromosorb using nitrogen as carrier gas. The oven temperature was 150°C. After elution of n-butane the column was backflushed and C_5+ was recorded. A standard gas containing methane, ethane, propane, n-butane, n-pentane and n-hexane was used for quantitation.

2.2 Lithological descriptions

Lithological examinations are normally carried out using a binocular microscope (maximum 50x magnification). Colour descriptions are in accordance with "Rock Colour Chart" published in 1979 by the Geology Society of America. Boulder, Colorado. The clients have a choice of three different levels of description from a simple identification of the lithologies to a full examination of the sample. Handpicking of the cuttings for organic geochemical analyses is based on these descriptions.

2.3 Total Organic Carbon

Bulk samples were crushed in a mortar. Aliquots of the samples were then weighed into Leco crucibles and treated three times with hot 10% HCl to remove carbonate, and washed 4 times with distilled water to remove traces of HCl. The crucibles were then placed on a hot plate and dried for 24 hours. The total organic carbon (TOC) content of the dried samples was determined using a Leco CR12 carbon analyser.

2.4 Rock-Eval Pyrolysis

Crushed sample (100mg) was weighed into a platinum crucible the base and cover of which are made of sintered steel, and analysed on a Rock-Eval pyrolyser.

2.5 Extractable Organic Matter

Powdered rock was extracted by a flowblending for 3 minutes using dichloromethane (DCM) with 1% methanol as solvent. The DCM used was of organic geochemical grade and blank analyses showed the occurrence of negligible amounts of contaminating hydrocarbons. Activated copper filings were used to remove any free sulphur from the samples. After extraction the solvent was removed on a Buchi Rotavapor and the amount of extractable organic matter (EOM) was determined.

Asphaltene precipitation was performed according to the procedure given by Statoil

2.6 Chromatographic Separation

The extractable organic matter (EOM) was separated into saturated fraction, aromatic fraction and non hydrocarbon fraction using a MPLC system with hexane as eluant (Radke et al., Anal. Chem., 1980). The various fractions were evaporated on a Buchi Rotavapor and transferred to glass vials and dried in stream of nitrogen.

2.7 Gas Chromatographic Analysis

The saturated hydrocarbon fractions were diluted with n-hexane and analysed on a HP 5730A or a HP 5790 GC. Both GC's are equipped with 15m DB-1 fused silica columns and hydrogen (ca. 2.5 ml/min.) is used as carrier gas. Injections are performed in split mode (split ratio 1:10). The temperature program applied is $80^{o}C$ (2 min.) to $280^{o}C$ at $4^{o}C$/min.

The total aromatic fractions were, after dilution with n-hexane, analysed on a Carlo Erba Fractovap Series 2150 GC or a HP 5730 A GC. Both GC's are equipped with 30m DB-5 fused silica columns, and hydrogen (2.5 ml/min.) is used as carrier gas. The temperature program applied is $80^{o}C$ (2 min.) to $280^{o}C$ at $4^{o}C$/min. on both systems. Injections are performed splitless on the Carlo Erba GC, while split injections (split ratio 1:10) are used on the HP 5730 A GC.

The data processing for all the GC analyses was performed on a VG Multichrom lab data system.

2.8 Gas chromatography - mass spectrometry (GC-MS)

GC-MS analyses were performed on a VG Micromass 70-70H GC-MS-DS system. The Varian Series 3700 GC was fitted with a fused silica OV-1 capillary column (30m x 0.3mm i.d.). Helium ($0.7 kg/cm^2$) was used as carrier gas and the injections were performed in split mode (1.5µl, split ratio 1:15). The GC oven was programmed from $70^{o}C$ to $280^{o}C$ at $4^{o}C$/min. after an initial isothermal period of 2 minutes.

The saturated hydrocarbons were analysed in multiple ion mode (MID) at a scan cycle time of approximately 2 secs. Full data collection was applied for the aromatic hydrocarbons at a scan time of 1 sec/decade. The mass spectrometer operated at 70eV electron energy and an ion source temperature of $200^{o}C$. Data acquisition was done by VG data systems.

Peak identification was performed applying knowledge of elution patterns in certain mass chromatograms. Calculation of peak ratios was done from peak height in the appropriate mass chromatograms.

2.9 $\delta^{13}C$ istotope analyis

The $\delta^{13}C$ isotope analysis was performed by mass spectrometry at Institute for Energy Technology (IFE) in Oslo according to their method. Their reference value for the standard NBS-22 is -29.8.

2.10 Pyrolysis Gas Chromatography (Py-GC Programmed)

Thermal extraction (S1)

20-30 mg of whole rock sample was placed in a boat shaped sample probe and thermoextracted in a stream of helium at 350°C for 5 minutes.

Pyrolysis-Gas Chromatography (S2)

20-30 mg of solvent- and thermoextracted whole rock sample was programmed pyrolysed in helium (350°C to 550°C at 35°C/min.) in a furnace type pyrolyzer. The outlet of the pyrolyzer was directly connected to a splitter (30:1) and a fused silica capillary column. The pyrolysis product was trapped in a cooled (liq. Nitrogen) U-shaped section at the front of the column.

The outlet of the splitter was directly connected to a FID detector and the course of the pyrolysis could be followed by the detector response of the bulk pyrolysis product (30:1) which was recorded as a broad peak. At the end of the pyrolysis the pyrolysis product was injected on to the capillary column at ambient temperature (by removing the nitrogen bath) and analysed under the GC conditions given below.

GC-conditions

Column: 25m OV-1, I.D. 0.25 mm, fused silica capillary column.
Carrier gas: Helium with inlet pressure 8 psi. Flow; ca. 1.5. ml/min.
Oven programme: 30° - 280°C at 4°C/min.

2.11 Vitrinite Reflectance

Vitrinite reflectance measurements of 4 of the samples, were done. The samples were mounted in Bakelité resin blocks; care being taken during the setting of the plastic to avoid temperatures in excess of 100°C. The samples were then ground, initially on a diamond lap followed by two grades of corundum paper. All grinding and subsequent polishing stages in the preparation were carried out using isopropyl alcohol as lubricant, since water leads to the swelling and disintegration of the clay fraction of the samples.

Polishing of the samples was performed on Selvyt cloths using three grades of alumina, 5/20, 3/50 and Gamma, followed by careful cleaning of the surface.

Reflectance determinations were carried out on a Leitz M.P.V. microphotometer under oil immersion, R.I. 1.518 at a wavelength of 546 nm. The surface of the polished block was searched by the operator for suitable areas of vitrinitic material in the sediment. The reflectance of the organic particle was determined relative to optical glass standards of known reflectance. Where possible, a minimum of twenty individual particles of vitrinite was measured.

The samples were also analysed in UV light, and the colour of the fluorescing material determined. Below, a scale comparing the vitrinite reflectance measurements and the fluorescence measurements is given.

VITRINITE REFLECTANCE R.AVER. 546 NM 1516	0.20		0.30	0.40	0.50	0.60	0.70	0.80	0.90		1.00	1.10
% CARBON CONTENT DAF.	57		62	70	73	76	79	80.5	82.5		84	85.5
LIPTINITE FLUOR NM	725	750	790	820	840		860	890		940		
EXC. 400 nm BAR. 530 nm colour	G	G/Y	Y	Y/O	L.O	M.O.		D.O.		O/R		R
zone	1	2	3	4	5	6		7		8		9

<u>NOTE</u>:Liptinite NM = Numerical measurements of overall spore colour and not peak fluorescence wavelength.

Relationship between liptinite fluorescence colour, vitrinite reflectance and carbon content is variable with depositional environment and catagenic history. The above is only a guide. Liptinite will often appear to process to deep orange colour and then fade rather than develop or O/R red shade. Termination of fluorescence is also variable.

2.12 Processing of Samples and Evaluation of Visual Kerogen

Crushed rock samples were treated with hydrochloric and hydrofluoric acids to remove the minerals. A series of microscopic slides contain strew mounts of the residue:

T-slide represents the total acid insoluble residue.
N-slide represents a screened residue (15µ mesh).
O-slide contains palynodebris remaining after flotation ($ZnBr_2$) to remove heavy minerals.
X-slides contain oxidized residues, (oxidizing may be required to remove sapropel which embeds palynomorphs, or where high coalification prevents the identification of the various groups).

T and/or O slides are necessary to evaluate kerogen composition/-palynofacies which is closely related to sample lithology.

Screened or oxidized residues are normally required to concentrate the larger fragments, and to study palynomorphs (pollen, spores and dino-flagellates) and cuticles for paleodating and colour evaluation.

So far visual evaluation of kerogen has been undertaken from residues mounted in glycerine jelly, and studied by Leitz Dialux in normal light (halogene) using x10 and x63 objectives. By x63 magnification it is possible to distinguish single particles of diameters about 2 and, if required, to make a more refined classification of the screened residues (particles >15µ).

The colour evaluation is based on colour tones of spores and pollen (preferably) with supporting evidence from colour tones of other types of kerogen (woody material, cuticles and sapropel). These colours are dependant upon the maturity, but are also influenced by the paleo-environment (lithology of the rock, oxidation and decay processes). The colours and the estimated colour index of an individual sample may therefore differ from those of the neighbouring samples. The techniques in visual kerogen studies are adopted from Staplin (1969) and Burgess (1974).

In interpretation of the maturity from the estimated colour indices we follow a general scheme that is calibrated against vitrinite reflectance values (R_0).

Ro	0.45	0.6	0.9	1.0	1.3
colour index	2-	2	2+	3-	3
Maturity intervals	Moderate mature	Mature (oil window)			Condensate window

3. RESULTS AND DISCUSSION

The analysed sequence, 825-2160m has been divided into 6 zones mainly based upon lithology. The zones are as follows:

Zone A: 825-1470m
Zone B: 1485-1770m
Zone C: 1785-1860m
Zone D: 1860-1935m
Zone E: 1935-2085m
Zone F: 2085-2160m T.D.

3.1 Lithology and total organic carbon

For total organic carbon analysis 37 sidewall cores and 44 cuttings were analysed. Sandstones were not analysed. The classification used for the TOC data is as follows:

<0.5%	:	poor source rock
0.5-1.0%	:	fair source rock
1.0-2.0%	:	good source rock
>2.0%	:	rich source rock

Zone A: 825-1470m; This zone consists mostly of medium dark grey - dark grey, silty claystones (80-100%). At the upper boundary there are siltstones and some light grey - greenish grey claystones. These claystones have poor TOC values (0.17% and 0.39%). The medium dark grey - dark grey claystones have a poor to fair TOC values varying from 0.38% to 1.00%.

Zone B: 1485-1785m; This zone consists mostly of dark grey, silty claystones. Casing was set at 1500m (as given by the client), and the sample interval from 1515m to 1530m consists mostly of casing cement. At the lower boundary some dark reddish-brown and light brownish-grey claystones are developed, and minor amounts of siderite/dolomite (10%). These claystones have poor TOC values (0.02-0.09%), while the dark grey claystones have fair to good TOC abundances (0.63-1.93%). Two sidewall cores which were analysed consist of dark brownish-grey claystones (at 1738m and 1747m) and have good to rich TOC values (1.35% and 2.86%).

<u>Zone C: 1785-1860m;</u> The upper boundary of this zone coincides roughly with the top of Jurassic at 1793m (as given by the client). The lithology is dominated by dark brownish-black claystones with minor amounts of dolomite and light brownish-grey claystones at the upper and lower boundaries. Sand appears at the bottom of the zone. The TOC values of the dark grey claystones indicate a rich potential with TOC values increasing from 3.29 to 10.47% down the sequence.

<u>Zone D: 1860-1935m;</u> The upper boundary of this zone has been set where medium dark grey - greyish black claystones first appear. The top of Middle Jurassic is slightly higher up at 1848.5m (as given by the client). These claystones have good TOC values (1.31% and 1.51%). At 1890m to 1935m greyish black claystones with rich TOC abundances (3.42-5.03%), are interbedded with the medium dark grey - dark grey claystones which have good TOC abundances (1.27-2.04%). The claystones are interbedded with sandstones, which vary from 10-60% of samples.

<u>Zone E: 1935-2085m;</u> Sandstone is the dominant lithology in this zone. At the upper boundary some claystones from the zone above persist, and at the bottom, dark grey - brownish grey claystones and small amounts of coal appear. Six samples were analysed from this zone. One sidewall core consisting of brownish - black claystone at 1968.50m has a very high TOC value (17.82%). This high value is due to coal particles. The TOC values of the minor claystones (ca. 10% of sample) at the bottom of the zone suggest they have a good to rich potential as source rocks (1.25-4.92%).

<u>Zone F: 2085-2160m;</u> The lithology in this zone contains mostly of medium dark grey - dark grey, silty claystones with varying amounts of sand (30-70%), which increases in amount downwards. The claystones show fair to good TOC values (0.98 - 1.42%). The sidewall cores analysed in this zone consists of light olive grey claystones and have poor TOC values from 0.10-0.48% in the lower part of the interval (below 2115 metres).

3.2 Light hydrocarbons

Light hydrocarbon values (µl/kg rock) are classified as follows:

C_1-C_4	C_5+		
<1000	<1000	:	poor source rock
1-3000	1-3000	:	fair source rock
>3000	>3000	:	good-rich source rock

Zone A: 825-1470m; The abundance of light hydrocarbons (C_1-C_4) is good throughout the zone and highest at the upper boundary. This is probably due to the presence of migrated light hydrocarbons in relatively porous siltstones. From 1140m down to 1500m there is an increase in the methane content without a similar rise in C_2-C_4 hydrocarbons and the wetness is therefore lower (4.21-16.29% compared to 15-30% above 1140m). The iC_4/nC_4 ratios vary from 0.52 to 2.45 and are highest in the interval with the high methane content.

Zone B: 1485-1770m; The abundance of light hydrocarbons (C_1-C_4) in this zone is poor at the upper boundary which is mainly due to casing cement in the sample interval. The abundance increases downwards in the zone to good values. The wetness is fairly high (23.05-50.91%), compared to the lower part of zone A but in the interval 1605-20m the wetness is again lower (12.41%). The iC_4/nC_4 ratios increase between 1545 and 1680m from 0.54 to 1.03 and then decrease to a value of 0.48 at the base of the zone, probably due to migration/diffusion of light hydrocarbons from the rich claystones in zone C.

Zone C: 1785-1860m; In this zone the lithology is dominated by the TOC-rich dark brownish-black claystones. The light hydrocarbon abundances of C_1-C_4 are good to rich throughout the zone and the abundance of C_5+ shows a sharp increase in this zone. The wetness is high (51.13-64.77%) and decreases downwards, and the iC_4/nC_4 ratios are low (0.37-0.53) and increased downwards in the zone. The abundance of C_1-C_5 hydrocarbons, the fairly high wetness and the low iC_4/nC_4 ratios indicate a mature source.

Zone D: 1860-1935m; The light hydrocarbon abundances of both C_1-C_4 and C_5+ are good in this zone, but lower than in the zone above. The wetness varies more, but is still high (35.13-94.78%). The iC_4/nC_4 ratios are low (0.36-0.53).

Zone E: 1935-2085m; The lithology in this zone is dominantly sandstone with minor coals. The light hydrocarbon abundances of both C_1-C_4 and C_5+ are good. The abundances of C_5+ are higher than in the zones above and decrease towards the bottom of the zone. The wetness and the iC_4/nC_4 ratios are the same as in the zone above. The high C_5+ hydrocarbon content suggests the presence of migrated hydrocarbons. The presence of coals might be expected to raise methane contents over those seen in zone D and E, and towards the base methane is more abundant where the minor claystones/coals are found.

Zone F: 2085-2160m; The abundance of both C_1-C_4 and C_5+ is lower in this zone. The wetness is the same as in the zones E and F, while the iC_4/nC_4 ratios are higher (0.36-0.71).

3.3 Rock-Eval pyrolysis

Twenty-three sidewall cores and fourty-four cuttings samples were analysed by Rock-Eval pyrolysis for evaluation of the source rock potential in this well. The following classification is used:

Petroleum potential
(S1+S2)
<1 : poor source rock potential
1-5 : fair source rock potential
>5 : good source rock potential

Zone A: 825-1470m; In this zone the analysed sequence starts at 975m. The hydrogen index are low indicating type III or IV kerogens, which in combination with the low petroleum potentials (<1) indicates that the medium dark grey to dark grey claystones have a poor source rock potential for gas. The production indices are generally low throughout the zone and suggest that there are no migrated hydrocarbons present. The T_{max} values from 424-433 indicate immature - early mature samples. One sample at 1260m shows a lower T_{max} value (414^oC) which is due to a low flat S2 peak.

Zone B: 1485-1785m; The hydrogen and oxygen indices in this zone are quite similar to zone A, indicating type III and type IV kerogens with poor to fair potential for gas. The production indices are higher than in zone A and at the maturity suggested by T_{max} (see below) the high

P.I. values are probably due to minor amounts of migrated hydrocarbons. The T_{max} values vary considerably from 411-445 but the main range of values is from 431-438 suggesting early mature - oil window maturity.

Zone C: 1785-1860m; In this zone another kerogen type appears. The hydrogen indices are high (from 284-456) and the oxygen indices are low (6-19) indicating type II and a mixed type II/III kerogen. The petroleum potential improves down to 1840m in this zone and the best kerogen quality, i.e. type II kerogen, is developed between 1800-1830m. The petroleum potential indicates a good-rich source rock potential for oil and gas. The production indices are low throughout the zone indicating that only minor hydrocarbon generation has occurred. The T_{max} values are low (424-430) indicating early mature samples which have started generation of hydrocarbons.

Zone D: 1860-1935m; There is a decrease in the hydrogen index values of kerogen in claystones in this zone compared to zone C, while the oxygen index values are slightly higher. A type III kerogen is present in the grey black claystones and they have a fair to good potential for gas. Type IV kerogens are present in the medium dark grey claystones, which have a poor to fair potential for gas. The production indices are low in this zone indicating that there is little or no migrated hydrocarbons. The T_{max} values from 434-441 indicate a mature oil window source while two samples with low T_{max} values (427 and 430) indicate a early mature source. The difference in T_{max} between those in zone C and those in B and D is probably due to the kerogen type. Generally for the same maturity T_{max} values are higher in type III than type II kerogens.

Zone E: 1935-2085m; In this zone the hydrogen index values are higher than in the zone above while the oxygen index values are slightly lower indicating a mixed type III/II kerogen which has a good potential for oil and gas. The sidewall core analysed at 2080m has type IV kerogen. The T_{max} values indicate that the samples are mature and that the samples from 2070m are oil window mature. The siltstone at 2025m shows a fairly high production index and S1 and may indicate the presence of migrated hydrocarbons.

Zone F: 2085-2160m; The hydrogen index values show a decrease and the oxygen index values show a slightly increase compared to the zone above and indicate a type III kerogen with a fair potential for gas. The T_{max} values indicate that the samples are oil window mature.

3.4 Extractable organic material and saturated hydrocarbons

Three sidewall cores and 7 cuttings samples were extracted for evaluation of the source rock potential of the well.

Tables 4-7 show the distribution of the various chromatographic fractions, while Table 8 gives the ratios calculated from the GC chromatograms. The Carbon Preference Indices were calculated as follows:

$$CPI\text{-}1 = \frac{2 * nC_{27}}{(nC_{26}+nC_{28})} \qquad CPI\text{-}2 = \frac{1}{2}\left(\frac{C_{25}+C_{27}+C_{29}+C_{31}}{C_{24}+C_{26}+C_{28}+C_{30}} + \frac{C_{25}+C_{27}+C_{29}+C_{31}}{C_{26}+C_{28}+C_{30}+C_{32}}\right)$$

The gas chromatograms of the saturated hydrocarbons are presented in figure 1.

Source rock classification based on amount and composition of bitumen:

Extractable Organic Matter (EOM in ppm):

<200ppm	:	poor source rock
200-500ppm	:	fair source rock
500-1000ppm	:	good source rock
>1000ppm	:	rich source rock

Extractable Hydrocarbons (EHC in mgs per gram TOC):

<10mgs/g	:	poor source rock
10-20mgs/g	:	fair source rock
20-100mgs/g	:	good-rich source rock
>100mgs/g	:	stain (depends on the kerogen type, type I kerogens can yield more than 100mgs/g).

Zones A, B: No samples from this zones were analysed.

Zone C: 1785-1860m; Four samples from the Upper Jurassic claystones were extracted. All samples in this zone contain rich amounts of extractable organic material (EOM) and approximately 32% of the EOM consist of hydrocarbons. The SAT/ARO ratios are low which suggests that the bitumen is from a relatively immature source.

A bimodal n-alkane distribution with maxima at nC_{15} and nC_{25} is seen from the gas chromatogram of the sample at the upper boundary of the zone. The gas chromatogram suggests a mixed input of terrestrial and marine input. The low molecular weight n-alkanes are the most abundant.

The bimodal character of the gas chromatograms decrease downwards in the zone, and a more front-biased n-alkane distribution is seen with maximum at nC_{15}. The gas chromatogram of the lowermost sample is more similar to the gas chromatogram of the sample at the upper boundary. This change is probably due to decrease in higher plant input and coincides with the improved petroleum potential of the kerogen which is seen from the Rock-Eval pyrolysis data.

The isoprenoids (nC_{13}-nC_{19}) are abundant in all the samples and pristane is most dominant. The pristane/phytane ratios decrease downwards in the zone (3.2-1.4), perhaps suggesting a change in input and/or increased anoxic character of the depositional environment at the base of the Upper Jurassic section. The CPI-values are fairly uniform, i.e. from 1.4 to 1.2 and indicate early mature samples.

Zone D: 1860-1935m; Three samples were extracted from this zone. The samples show good to rich amounts of extractable organic matter (EOM), increasing downwards. The amount of hydrocarbons in EOM vary from approximately 33.5% for the uppermost samples which are quite similar to the zone above and 57.9% for the lowermost sample in this zone. The SAT/ARO ratios vary, increasing downwards in the zone. The high percentage saturates in the lowest sample suggests the presence of migrated hydrocarbons.

The gas chromatograms of the three samples are quite similar and they are also quite similar to the gas chromatograms of the lowermost sample from zone C above. The pristane/phytane ratios are higher than in the lower part of zone C (2.1-2.2). This could indicate an environment of more terrestrial nature than in the zone above. The CPI-values (1.1-1.3) suggest that the samples are fairly mature, whereas the high pristane/nC_{17} ratios suggest that only minor hydrocarbon generation has occurred.

Zone E: 1935-2085m; From this zone two samples were extracted. The samples contain rich amounts of extractable organic matter (EOM) and approximately 36% of the EOM consist of hydrocarbons. The SAT/ARO ratios are low, quite similar to zone D.

The gas chromatograms of the two samples show a smooth front-biased n-alkane distribution with maxima at nC_{15} and nC_{16}. The pristane and phytane are not so prominent in this zone, but the pristane/phytane ratios are still high (1.9 and 2.3).

The brownish-black claystone analysed at the upper boundary shows a complex pattern between nC_{28} and nC_{34} which is probably due to triterpanes from the coal particles in the claystone. This complex pattern is not seen in the gas chromatogram of the other sample. The CPI-values are low (1.0 and 1.1) and indicate that the samples are mature. The low pristane/nC_{17} values (0.4 and 0.6) and the high percentage of low molecular weight hydrocarbons in coaly samples particularly the lower interval, suggest the presence of migrated hydrocarbons which is supported by the abundant C_5+ hydrocarbons found in this zone.

Zone F: 2085-2160m; One sample from this zone was extracted. The sample contain fair amounts of extractable organic matter (EOM) and 62.4% of the EOM consist of hydrocarbons. The SAT/ARO ratios is approximately one.

A bimodal n-alkane distribution with maxima at nC_{15} and nC_{26} is seen in the gas chromatogram of this sample. The n-alkane distribution in the nC_{20}-nC_{32} area are probably due to waxes from higher plants. The pristane/-phytane ratio is high (2.7) and the CPI value is 1.1 indicating that the sample is mature. Again the low molecular weight hydrocarbon envelope nC_{10}-C_{20} (max. nC_{15}) is probably due to migrated hydrocarbons, the waxy component may also represent migrated residual hydrocarbons.

3.5 Aromatic hydrocarbons

The samples will be discussed according to the zones. Table 9. gives the MNR, DMNR, MPI I and MPI II ratios calculated from the GC chromatograms and the gas chromatograms of the aromatic hydrocarbons are presented in Figure 2.

Zones A,B: No samples were analysed from these zones.

Zone C; 1785-1860m: The aromatic gas chromatograms in the Upper Jurassic claystone horizon are all quite similar. The methylnaphthalenes and dimethylnaphthalenes dominate over phenanthrene and methylphenanthrenes. Dibenzothiophene and the methyl dibenzothiophenes are most prominent in the lower samples and particularly in the sample from 1830m and the sidewall core from 1843m.

Zone D; 1860-1935m: In this zone the methylnaphtalenes are less prominent than in the zone above. The methyl dibenzothiophenes are only a minor component and phenanthrene and mono- and di-alkylated compounds are more prominent. This is considered to be due to a change in kerogen type from II in Upper Jurassic claystones in Zone C to type III kerogens in Zone D (mid-Jurassic).

Zone E; 1935-2085m: The aromatic gas chromatograms of these samples are quite similar. In this zone the methylnaphtalenes and the dimethylnaphthalenes are more prominent, whereas the aromatic sterane/triterpane hump is reduced in size compared to Zone D.

Zone F; 2085-2160m: This sample is different to the other aromatic gas chromatograms with a dominance of phenanthrene and methylphenanthrenes over the alkylated naphthalenes.

The variation in DMNR (dimethylnaphthalene ratio) is from 2.3-3.5. The value for the top of the Upper Jurassic claystones is ~2.5, which would suggest a fairly high maturity i.e. approximately peak oil generation. The MPI I values are also high generally between 0.7 and 0.8 over the interval from 1800-2148m which suggests a maturity of approximately 0.8-0.9% Ro. However, the MPI II values suggest a slightly lower maturity for the samples down to 1935m. The presence of abundant 1-methyl dibenzothiophene, in the Upper Jurassic samples in particular, makes it difficult to measure the 3-methyl phenanthrene with which it coelutes. Hence the lower MPI II values may be more accurate and indicate maturities below an 0.8% Ro equivalent. The jump up in MPI II values at 1968.5m and below may be due to the presence of abundant mature migrated hydrocarbons masking the true maturity.

3.6 GC-MS analysis of saturated steranes and terpanes

Saturated hydrocarbon fractions from four cuttings and one swc were analysed for their content of steranes and terpanes. Mass chromatograms and tabulated data from the chromatograms are presented in Figure 3 and Tables 10 and 11, respectively.

Zone A, B: No samples were analysed from these zones.

Zone C; 1785-1860m: The two samples from this upper Jurassic zone, 1830m and 1843m, show very similar distributions of both steranes and terpanes, representative of well mature hydrocarbons. Most of the isomerisation ratios are close to equilibrium, and thus the biomarkers seem to be of higher maturity than would be expected from the sediment data. The Rock-Eval data does not indicate any migrated hydrocarbons in these samples, and the biomarkers are believed to be indigenous.

Zone D; 1860-1935m: Only one sample (1935m) was analysed from this zone. The general distribution of steranes and terpanes is very similar to the two samples in the zone above, with the exception that the maturity of the biomarkers in this Middle Jurassic sample is lower than in the Upper Jurassic samples. This sample is a type III kerogen as compared to the type II or mixed II/III in the Upper Jurassic samples. There is also a change in the colour of the sediments, the Middle Jurassic being more grey than the brownish samples from above.

Zone E; 1935-2085: The two samples from this zone show the same overall distribution of triterpanes, with the deepest sample seemingly slightly less mature than the other. In the range of tricyclic terpanes some differences are seen in that the shallowest sample in the zone contains two unknown components, while the abundance of tricyclic terpanes is relatively low. Also the steranes show variations between the two samples, the swc at 1968.50m containing higher relative abundance of C_{29} steranes than any of the other four samples. The sterane maturity ratios suggest that the deepest sample is the most mature of the two.

Zone F; 2085-2160m T.D.: No samples were analysed from this zone.

The non systematic changes in maturity of the biomarkers with increasing depth may be explained by the changes in type of kerogen.

The sidewall cores at 1968.50m shows biomarker distribution different to the other samples, indicating possibly different organic environment in this case.

3.7 GC-MS analysis of aromatic hydrocarbons

Total ion and mass chromatograms representing aromatic hydrocarbons are given in Figure 4, and maturity data from aromatic steranes are presented in Table 12.

Zone A, B: No samples were analysed from this zone.

Zone C; 1785-1860m: The two samples from this zone have high relative abundance of low molecular weight naphthalenes compared to the higher molecular weight phenanthrenes. In the individual mass chromatograms only minor variations are seen. The aromatic sterane maturity ratios give some contradictory results, in that the side chain cracking of individual steranes is relatively low, while the relative amount of triaromatic steranes is high.

Zone D; 1860-1935m: This sample has a higher input of higher molecular weight compounds. The relative distribution within each group is, however, not much different to the zone C samples. The maturity seems from the relative amount of triaromatic steranes to be lower for this sample. This sample has also a very high abundance of sulphur-aromatics such as dibenzothiophenes.

Zone E; 1935-2085m: These samples show a more even distribution of naphthalenes and phenanthrenes, and the relative amounts of dibenzothiophenes are lower than in the zone above. The maturity is increased compared to what was seen higher up in the well.

Zone F; 2085-2160m T.D.: No samples were analysed from this zone.

3.8 $\delta^{13}C$ carbon isotope analysis

Five saturated and 5 aromatic hydrocarbon samples were analysed for $\delta^{13}C$ isotope ratios. There was too little sample available to obtain any results from $\delta^{13}C$ isotope analysis of B-5655, saturated hydrocarbons.

Table 13 shows the $\delta^{13}C$ isotope ratios.

The $\delta^{13}C$ isotope values of the saturated hydrocarbons vary from -29.9 to -30.6 (average of -30.2) and the aromatic hydrocarbons vary from -27.4 to -30.3 (average of -28.6).

Upper Jurassic claystones give values with a roughly 1 per mil difference for the aromatics, 1830m and 1843m (top sample is lighter). The difference is probably significant and possibly marks a difference in organic input. The top sample probably contains more terrestrial (higher plant material) than the lower sample. This is supported by the observations made on CPI and pristane/phytane ratios, although the higher hydrogen index values for the top sample would suggest a larger algal input to the top sample. The Mid-Jurassic claystone sample from 1935m gave similar isotope values to the lower sample of the Upper Jurassic. The slightly lower aromatic ^{13}C isotope value for the coaly shale from 1968.5m is probably from migrated hydrocarbons and is not representative for the mainly higher plant source for the organic matter in this sample. Similarly for the sample from 2085m the presence of migrated hydrocarbons has probably affected the values obtained.

3.9 Pyrolysis-gas chromatography (Py-GC, Programmed)

Ten solvent- and thermally extracted whole rock samples were analysed by Py-GC. The peaks are identified on the basis of retention and mass spectrometric data of other kerogens. Figure 5 shows the pyrolysis-gas chromatograms.

Peak identities in the pyrograms:

1 = toluene
2 = (m+p)-xylenes
3 = o-xylene
4 = C_3-alkylbenzenes+phenol (P)
5 = C_4-alkylbenzenes+methylphenols (C_1P)
6 = C_4- and C_5-alkylbenzenes+naphthalene
7 = 2-methylnaphthalene
8 = 1-methylnaphthalene
9 = prist-1-ene
10 = prist-2-ene

C_7,C_9 etc. are n-alkene/n-alkane doublets of that carbon number.

Zone A,B: No samples from this zones were analysed.

Zone C; 1785-1860m:
B-5557 (1800m): The pyrogram shows an n-alkene/n-alkane homology ranging from C_7 to ca. C_{30}. The abundance of phenol and aromatics are relatively high suggesting an input of material derived from higher plants. The pyrogram shows a mixed type III/II kerogen.

B-5559 (1830m): The n-alkene/n-alkane homology ranges from C_7 to ca C_{30}, but the abundance of phenol and aromatics is less than the sample above i.e. a type II kerogen with a lower higher plant input.

B-5651 (1843m): The pyrogram is quite similar to the sample above, B-5559 i.e. a type II or II/III kerogen.

B-5652 (1847m): The pyrogram is quite similar to B-5557 and suggests a mixed type III/II kerogen.

Zone D; 1860-1935m:

B-5562 (1875m): The pyrogram shows an n-alkene/n-alkane homology ranging from C_7 to ca C_{20}. The phenol and aromatics are abundant suggesting a large input of material derived from higher plants. A type III kerogen fingerprint.

B-5564 (1905m): The pyrogram is quite similar to the one above, but the aromatics are less prominant in this sample. A type III/II fingerprint.

B-5566 (1935m): The pyrogram is quite similar to B-5564 i.e. a type III/II kerogen fingerprint.

Zone E; 1935-2085m:

B-5655 (1968.50m): The pyrogram shows an n-alkene/n-alkane homology ranging from C_7 to ca C_{30}, but the pattern is different than for the samples above. There is a more prominent alkene/n-alkane homology from C_{20}-C_{25} which indicates a contribution from waxy-cuticular material. The abundance of alkylbenzenes and naphthalene are higher, and the pyrogram indicates a type III kerogen.

B-5576 (2085m): The pyrogram is quite similar to B-5655 i.e. a type III kerogen probably with a significant input derived from cuticles of higher plants.

Zone F; 2085-2160m:

B-5580 (2145m): The pyrogram shows an n-alkene/n-alkane homology ranging from C_7 to ca C_{12}. The low alkene/n-alkane ratio and prominent n-alkanes between C_{13}-C_{18} indicate a kerogen with little or no capacity to generate liquid hydrocarbons. The kerogen will source only wet gas.

Summary

The pyrograms of the Upper Jurassic claystones (Zone C) are dominated by low molecular weight compounds from C_1-C_8 and there is a high abundance of aromatics, particularly in the uppermost sample, relative to the n-alkene/n-alkane homology. This indicates that humic components i.e. from a higher plant source dominate. However, the n-alkene/n-alkane homology above nC_{20} is relatively minor, and (unlike say B-5655 from Zone E, see below). The higher plant source is unlikely to be of cuticular origin. There is also a hump of unresolved components (presumably napthenic) with higher retention times than nC_{13}. The pyrograms indicate the Upper Jurassic claystones will source both oil and gas.

Pyrograms of claystones in the top part of the Middle Jurassic (Zone D) lack the naphthenic hump and it is considered that they would source mainly wet gas and condensate-range hydrocarbons. The prominent cuticular component in the pyrograms of claystones of zone E suggest that they would source both condensates and a waxy oil.

3.10 Analysis in reflected light

A total of twenty carbonate and argillaceous samples was analysed from geochemical zones A (825-1470m), B (1485-1770m), C (1785-1860m), E (1935-2085m) and F (2085-2160m) in well 7121/7-1. The tops of zone C (1785 and zone D (1860m) are roughly analgous to the Upper and Middle Jurassic tops at 1793m and 1848.5m respectively. Vitrinite reflectance histograms and data from the reflected light analysis are presented in Figure 6 and Tables 14 and 15, respectively.

Zone A (825-1470m): Fourteen, predominantly carbonate or claystone samples at 850m, 909m, 950.5m, 1004m, 1050m, 1128m, 1225m, 1275m, 1327m and 1435m were analysed from this zone. Inertinite and reworked vitrinite are the predominant maceral types in these samples. Well preserved palynomorphs were observed in the carbonate lithologies and the best examples occurred in the sample at 909m. Liptinitic macerals are present in trace to fair amounts throughout the section.

Due to the predominance of inertinite and reworked vitrinite in most of the samples, representative reflectance measurements were only obtained towards the base of the zone. Indigenous vitrinite reflectance values vary between 0.60% (1171m) and 0.66% (1275m and 1327m). The reflectance values from 1171m and 1435m are based on one particle each, but since the values are close to those obtained from larger vitrinite populations at 1275m and 1327m, it is felt that they are probably representative. Liptinite fluorescence colours vary from yellow (3) to middle orange (6) and support the above vitrinite reflectance values. The maturation data suggest that the base of zone A is entering the maturation zone associated with the main phase of oil generation.

Zone B (1485-1770m): A total of six, predominantly claystone, samples was examined from zone B. Generally, inertinite and reworked vitrinite are the predominant maceral types in these samples although non-fluorescent liptinite stringers are the predominate maceral type in the sample at 1725m. Indigenous vitrinite reflectance values vary between 0.56% (1540m) and 0.71% (1642m) and are consistent with liptinite fluorescence colours which vary from light orange (5) to dark orange (7). The data indicate that the organic matter in this zone is probably thermally mature.

Zone C (1785-1860m): One claystone sample from this zone was examined. Liptinitic material is the predominant maceral type in this sample and brown liptinitic staining affects a lot of the vitrinite particles present in the sample. A vitrinite reflectance value of 0.58% was obtained from this sample. The low value obtained relative to those in zones A and B may be due to subtle staining of the vitrinite particles by liptinitic material. The well preserved sporinite in the samples has an ultraviolet fluorescence colour of middle orange (6), which is slightly higher than might be expected from the vitrinite reflectance value.

Zone D (1860-1935m): No samples from this zone were examined based on instructions from Statoil.

Zone E (1935-2085m): A siltstone sample from this zone (2025.5m) was examined in reflected light. Liptinite macerals and vitrinite are the predominant maceral types in this sample. The vitrinite particles were often associated with liptinite and frequently showed evidence of staining. Obviously-stained vitrinite particles were not measured. Two populations of reflectance readings were obtained with mean values of 0.50% and 0.74%. It is suggested that the lower value may be a result of subtle liptinite staining and would therefore be unrepresentative of the thermal maturity of the sample. The higher reflectance value is consistent with the middle to dark orange (6-7) fluorescence colours obtained from the liptinite particles.

Zone F (2085-2160m): One carbonate sample at 2135m was examined from this zone. Inertinite is the main maceral type present although reworked vitrinite and poorly preserved palynomorphs are also present. A vitrinite reflectance reading of 1.33% was obtained and this value probably represents reworked material. Middle orange (6) fluorescence was observed in a few liptinite particles and suggests a similar thermal maturity to that in the overlying zone.

3.11 Analyses in transmitted light

The evaluation of deposits in 7121/7-1 has been based on studies of residues from 20 sidewall cores. Data from these analyses are represented in Tables 14 and 16.

Residues from 850m to 1177m seem immature to moderate mature. Material from 1225m to 2135m reflects a maturity level about the top of the oil window. Colour indices of values above 2-/2 were considered as due to environmental control.

There is a strong influx of terrestrial debris in most samples. Woody sources dominate in the upper part of this well. Cuticles represent a major input particularly in samples below 1700m.

Cysts and/or algal material were recorded throughout, but are particularly abundant at about 900m, 1000m, 1128m to 1225m and at 1576m.

The energy conditions reflected are variable. Deposition close to vegetated land may be suggested for the lowest parts of the well (1600-2135m), while the upper part reflects marine conditions (850-1300m).

Description of individual samples

B-5607 (850m): The finely dispersed residue is dominated by dark woody material including structured as well as apparently nonstructured fragments. Amorphous and algal remains account for about 25%.
Colour index: 1+.

B-5609 (909m): The residue is finely dispersed and fully dominated by dinoflagellate cysts. Woody material is subordinate. The dinoflagellate cysts include one dominant form.
Colour index: No determination possible. (Pollen grains or spores were not observed).

B-5611 (950.5m): A very small residue that was dominated by black acid resistant minerals. The sieved residue reveals woody, mostly dark reworked/oxidised material and a varied assemblage of dinoflagellate cysts.
Colour index: As for the above sample, no determination was possible due to the paucity of pollen.

B-5613 (1004m): A residue of grey amorphous material partly as aggregates with a dominant element of dinoflagellate cysts. Woody material accounts for about 20% and includes structured woody cells as well as degraded material. As at the 909m level the dinoflagellate cyst assemblage is dominated by very few forms.
Colour index: No determination was possible since pollen grains and spores were not observed.

B-5615 (1050m): The residue is rich in grey amorphous material but is dominated by wood remains, grading from black opaque fragments towards more light coloured structured woody cells. A fairly rich, variably well preserved cyst assemblage and rare pollen grains.
Colour index: 1+/2, 2+/2, 2. The pollen recorded are variably coloured and seem to reflect some staining.

B-5617 (1128m): The residue is similar to B-5613 (1004m) described above.
Colour index: No determination was possible since pollen grains and spores were not observed.

B-5619 (1177m); B-5621 (1225m); B-5623 (1275m); B-5625 (1327m): The residues show a strong influx (50-80%) of variably coloured woody material showing cell structures. The fine material was evaluated as from algal sources, but there is also grey amorphous substance. The palynomorphs are mainly dinoflagellate cysts in the two upper samples. The two lower samples also include spores and pollen, and in B-5625 some cuticles. The preservation and colours seem variable throughout the interval and probably reflect changes in depositional environment and lithology.
Colour index: 2-/2, 2, 2/2+.

B-5628 (1435m): The residue has a matrix of fine, strongly degraded woody material and supposed algal material. It is rich in dark acid resistant minerals together with dark opaque woody material. The main part of the woody matter is strongly degraded and light coloured. Palynomorphs are thinwalled apparently etched and variably well preserved. Cuticles are of variable coarseness.
Colour index: 2-/2.

B-5630 (1480m); B-5632 (1540m): Small residues characterised by organic

aggregates also including acid resistant minerals. The residues are dominated by woody matter, a mixture of greyish etched particles and variably dark coloured structured particles. The palynomorphs are very thinwalled and of somewhat greyish colour quality, a feature controlled by the lithology.
Colour index: 2-, 2-/2+, 2+.

B-5633 (1576m): A fine amorphous matrix, evaluated as having algal sources, accounts for about 60% of the residue. Large and mediumsized structured woody particles. Thinwalled cysts have a dull greyish colour. Pollen seem stained. The palynomorphs are of fairly poor preservation.
Colour index: 2, 2/2+, 2+.

B-5635 (1642m): The residue is a mixture of degraded material from terrestrial sources and is dominated by structured woody material (about 60%) and cuticles (about 20%). Some algal material. Palynomorphs include pollen, spores and dinoflagellate cysts of variable preservation.
Colour index: 2.

B-5637 (1680m): Resemblance with B-5635 above but relative increase of algal material (about 25%) and decrease of woody matter. Variable but strong degradation.
Colour index: 2-/2, 2.

B-5641 (1725m); B-5663 (1847m): Dense, pyritic aggregates of strongly degraded material. Wood remains and cuticles evaluated as equally important. Chemical oxidation and refined processing techniques are necessary for more confident evaluation of relative kerogen composition.
Colour index: 2-/2, 2.

B-5657 (2025.5m): Fairly coarse cuticles and wood dominate the residue and appear to be mechanically fragmented. Pollen and spores are of fairly poor preservation.
Colour index: 2.

B-5661 (2135m): Wood material dominates the residue and includes black woody (coaly) fragments as well as elongated structured pieces. Cuticles of variable thickness and preservation. Pollen and spores are fairly well preserved.
Colour index: 2-/2, 2.

4. CONCLUSIONS

The maturity of this well is mainly based on T_{max} values obtained from Rock-Eval pyrolysis, vitrinite reflectance, spore fluorescence colours and spore colour in transmitted light. In the following each zone will be discussed separately.

Zone A; 825-1470m: This zone contains mostly of medium dark grey - dark grey, silty claystones with poor to fair TOC values (0.38-1.00%). Optical observations indicate that the organic matter consists mostly inertinite and reworked vitrinite. Kerogens are mostly poor type III and IV throughout the zone and they have a poor potential for gas. The abundance of C_1-C_4 hydrocarbons is good. From 1140m down to 1500m there is an increase in the methane content without a similar rise in C_2-C_4 hydrocarbons. All data indicate that the samples are immature to moderate mature.

Zone B; 1485-1770m: This zone consists mostly of dark grey silty claystones and is quite similar to the zone above. The TOC values of these claystones are fair to good, and the kerogen type is III and IV throughout the zone. Claystones have a poor to fair potential for gas. The abundance of light hydrocarbons (C_1-C_4) is low at the upper boundary which is mainly due to the presence of casing cement. The C_1-C_4 abundance increases downwards. The wetness is higher (23.05-50.91%) than zone A. The iC_4/nC_4 ratios increase between 1545m and 1680m and then decrease to the base of the zone. The decrease below 1680m is probably due to migration/diffusion of light hydrocarbons from the rich early mature claystones in zone C. The production indices are higher than in zone A and is possibly due to migrated hydrocarbons. The data indicates that the samples are moderate mature - early mature.

Zone C; 1785-1860m: The upper boundary of this zone coincides roughly with the top of Jurassic at 1793m. This zone consists mostly of rich dark brownish black claystones with TOC values increasing from 3.29 to 10.47% down the sequence.

The light hydrocarbon abundances of C_1-C_4 are good to rich throughout the zone and the abundance of C_5+ shows a sharp increase in this zone. The abundance of extractable organic matter is rich. Optical observations indicate that the organic matter is rich in liptinite. A type II (1800-30m) and a mixed type II/III kerogen is seen throughout the zone with a good - rich potential for oil and gas. The petroleum potential improves down to 1840m. This improved character coincides with changes seen in the saturated and aromatic hydrocarbon gas chromatograms from this zone which show a change probably due to decrease in higher plant input. The T_{max} values are low indicating early mature samples which have begun generation of hydrocarbons.

Zone D; 1860-1935m: The upper boundary of this zone has been set where medium dark grey - greyish black claystones first appear. The top of the Middle Jurassic is set slightly higher up at 1848.5m. At 1890m to 1935m greyish black claystones with rich TOC abundances (3.42-5.03%) are interbedded with medium dark grey - dark grey claystones. The medium dark grey claystones have good TOC values (1.27-2.04%) and a type IV kerogen is present with a poor to fair potential for gas. A type III kerogen is present in the dark grey claystones with a fair to good potential for gas. The production indices are low indicating little or no migrated hydrocarbons. The light hydrocarbon abundances of both C_1-C_4 and C_5+ are good, and there are good to rich amounts of extractable organic matter. The pristane/phytane ratios are higher than in the lower part of zone C (2.1-2.2) which might indicate a change probably to a larger terrestrial input and/or environment. All data indicate that the samples are mature.

Zone E; 1935-2085m: The lithology in this zone is dominantly sandstone. At the upper boundary some claystones from the zone above persist, and at the bottom, dark grey to brownish-grey claystones and small amounts of coal appear. The light hydrocarbon abundances of both C_1-C_4 and C_5+ are good. The abundances of C_5+ are higher than in the zones above and this suggests the presence of migrated hydrocarbons. The methane content is more abundant towards the base of the zone which is expected where coals are present. The amount of extractable organic matter is rich in this zone. One sidewall core consisting of brownish-black claystone at 1968.5m has a very high TOC value (17.82%) which is mainly due to coal particles. The TOC and petroleum potential values of the minor claystones at the bottom of the zone suggest they have a good to rich potential. The recognisable organic matter consists mostly of liptinite and vitrinite. A mixed type III/II kerogen is seen in the zone which has a good-rich potential for gas and condensate and possibly waxy oil. The T_{max} values indicate that the samples are mature and oil window mature from 2070m. The low pristane/nC_{17} values (0.4 and 0.6) and the high percentage of low molecular weight hydrocarbons in coaly samples, suggest the presence of migrated hydrocarbons, rather than indigenous hydrocarbon distribution. The jump in the MPI II values is also considered to be due to migrated hydrocarbons.

Zone F; 2085-2160m: The lithology in this zone consists mainly of medium dark grey-dark grey, silty claystones interbedded with sand (30-70% of samples). The claystones show fair to good TOC values (0.98-1.42%). The abundance of light hydrocarbons both C_1-C_4 and C_5+ are lower in this zone. Only one sample were extracted and it contained fair amounts of extractable organic matter. Optical observation indicated that the organic matter consists mostly of inertinite. The hydrogen and oxygen indices indicate a type III kerogen with a fair potential for gas. The low molecular weight hydrocarbons envelope from nC_{10}-nC_{20} seen from the gas chromatogram is probably due to migrated hydrocarbons. The waxy component in the nC_{20}-nC_{32} area may also represent migrated residual hydrocarbons. All data indicate oil window mature samples.

Summary

Maturity

Maturity has been estimated from vitrinite reflectance, spore colouration, spore fluorescence and Rock-Eval Tmax values. Screening data i.e. Rock-Eval Tmax show change from 426°C at 975m to 441°C at 2160m. This indicates a change from immature at the top of the analysed sequence to oil window mature at T.D. Spore colouration shows a trend from +1 at 850m and 2-/2, 2 at 2135m indicating a trend from immature to nearly oil window mature. The maturation data from vitrinite reflectance suggests that the maturation zone is entered at 1480m. Source rocks in zone A are immature to moderate mature. The source rocks in zone B are moderate mature to early mature, while zone C (the Upper Jurassic) is early mature. The source rocks in zone D and E down to ca. 2070m are early mature to oil window mature and from this depth to T.D. the source rocks are oil window mature.

Richness and source rock potential

The medium dark grey-dark grey, silty claystones with poor TOC values in zone A have a poor potential for gas. Kerogen type is III and IV. The same kerogen type is present in the dark grey claystones in zone B. The TOC values of the claystones are fair to good and they have a poor to fair potential for gas. Zone C which roughly corresponds to Upper Jurassic consists of TOC-rich dark brownish black claystones. A type II and a mixed type II/III kerogen with a good-rich potential for oil and gas is seen throughout the zone. In zone D various grey-coloured claystones occur. A type IV kerogen is present in the medium dark grey claystones with a poor to fair potential for gas. While in the dark grey claystones with rich TOC values, a type III kerogen with a fair to good potential for gas is present. In the sandstone-dominated zone (Zone E) minor claystones and small amounts of coal appear at the bottom. A type III/II kerogen is seen in the zone which has a good-rich potential for gas and condensate and possibly waxy oil. The medium dark grey-dark grey, silty claystones interbedded with sand in zone F show fair to good TOC values. A type III kerogen with a fair potential for gas is present.

Migrated hydrocarbons

In zone B above the rich claystones in zone C, both iC_4/nC_4 ratios which decrease towards the base of the zone and the high production indices suggest the presence of migrated hydrocarbons. The abundance of C_5+ hydrocarbons is high in zone E compared with the zone above, and this suggests the presence of migrated hydrocarbon. Also the low pristane/n-C_{17} values and the high percentage of low molecular weight hydrocarbons suggest presence of migrated hydrocarbons. The gas chromatogram of the sample extracted in zone F indicate that migrated hydrocarbons also are present in this zone.

TABLE I a.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN HEADSPACE

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5505	1020	21028	3340	2551	501	642	285	28063	7035	25.07	0.78
B 5507	1050	97522	13154	6707	941	1255	710	119580	22058	18.45	0.75
B 5509	1080	56490	5173	2769	610	496	269	65537	9047	13.81	1.23
B 5511	1110	8421	1112	620	154			10307	1886	18.30	
B 5513	1140	3438	117	41				3596	158	4.38	
B 5515	1170	71442	1952	538	137	84	71	74155	2713	3.66	1.63
B 5517	1200	25763	1243	587	113	103	67	27809	2046	7.36	1.09
B 5520	1245	33581	785	298	89	49		34803	1222	3.51	1.81
B 5521	1260	9004	229	79	23			9335	331	3.55	
B 5523	1290	48716	1327	374	122	44	42	50584	1867	3.69	2.75
B 5525	1320	72980	2529	929	296	124	111	76858	3878	5.05	2.38
B 5527	1350	76319	2223	701	241	99	102	79582	3264	4.10	2.43
B 5531	1410	20686	2111	943	345	152	119	24236	3551	14.65	2.28
B 5533	1440	52013	2782	1186	385	225	103	56591	4578	8.09	1.71
B 5535	1470	74929	3938	1389	339	202	59	80797	5868	7.26	1.68
B 5537	1500	1074	34	9				1118	43	3.89	
B 5539	1530	8		23				31	23	73.02	
B 5541	1560	1355	181	79				1614	260	16.09	
B 5543	1590	64	60	153				277	213	76.92	
B 5545	1620	29115	1947	965	211	201	205	32439	3324	10.25	1.05
B 5547	1650	14962	1589	776	193	170	125	17689	2727	15.42	1.13
B 5549	1680	35361	4176	2102	573	399	217	42611	7249	17.01	1.44
B 5551	1710	2954	275	108				3337	383	11.48	
B 5553	1740	22303	3370	1044	170	179	171	27067	4764	17.60	0.95

TABLE I a.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN HEADSPACE

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5555	1770	3042	891	458	80	56		4528	1486	32.81	1.43
B 5557	1800	20665	9382	4920	683	1493	693	37142	16477	44.36	0.46
B 5558	1815	48856	21547	10947	1606	3636	2177	86591	37736	43.58	0.44
B 5559	1830	30302	14052	8162	906	1933	1207	55354	25053	45.26	0.47
B 5560	1845	53632	23659	8783	792	1520	771	88385	34753	39.32	0.52
B 5561	1860	46588	19096	6568	1004	1825	2105	75082	28494	37.95	0.55
B 5562	1875	22829	4756	1598	264	381	388	29827	6998	23.46	0.69
B 5563	1890	282	525	467	87	130	100	1492	1209	81.07	0.67
B 5564	1905	24777	4721	2010	452	625	934	32584	7808	23.96	0.72
B 5565	1920	29887	4364	2835	902	1168	1977	39155	9268	23.67	0.77
B 5566	1935	324	488	750	219	447	1455	2228	1904	85.45	0.49
B 5567	1950		O P E N	L I D							
B 5568	1965	15509	5590	4667	1146	2193	3925	29105	13597	46.72	0.52
B 5569	1980	16020	5464	6111	1578	3046	4832	32219	16199	50.28	0.52
B 5570	1995	8178	4588	5797	1529	2906	5025	22998	14820	64.44	0.53
B 5571	2010		O P E N	L I D							
B 5572	2025	504	748	1331	395	857	2651	3834	3330	86.85	0.46
B 5573	2040	40396	13804	10320	2308	4562	8331	71390	30993	43.41	0.51
B 5574	2055	7862	4040	4913	1486	3182	7460	21482	13620	63.40	0.47
B 5575	2070	42347	12512	6509	1359	2372	5033	65099	22752	34.95	0.57
B 5576	2085	44234	14415	5492	820	1217	1631	66178	21944	33.16	0.67
B 5577	2100	478	448	376	73	136	222	1510	1033	68.37	0.54
B 5578	2115	23848	12339	6612	997	1251	1293	45048	21200	47.06	0.80
B 5579	2130	1002	1657	1687	303	481	706	5130	4128	80.47	0.63

TABLE I a.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN HEADSPACE

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5580	2145	31	54	80				165	134	81.14	
B 5581	2160	5671	3304	4840	1190	1578	2957	16583	10913	65.80	0.75

TABLE I b.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN OCLUDED

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5505	1020	327	328	1510	443	1169	1536	3777	3450	91.35	0.38
B 5507	1050	252	286	1096	272	732	1298	2638	2386	90.45	0.37
B 5509	1080	367	258	679	198	287	496	1789	1422	79.49	0.69
B 5511	1110	240	93	323	119	1301	358	2076	1836	88.42	0.09
B 5513	1140	292	99	210	88	90	305	780	487	62.50	0.97
B 5515	1170	202	80	161	70	70	213	584	382	65.37	0.99
B 5517	1200	209	97	314	99	153	354	873	663	76.00	0.65
B 5520	1245	126	31	93	35	38		324	198	61.01	0.91
B 5521	1260	135	30	79	31	28		303	169	55.59	1.10
B 5523	1290	198	75	133	47	25	144	479	281	58.64	1.92
B 5525	1320	163	64	145	61	52	124	485	322	66.37	1.18
B 5527	1350	199	108	182	79	61	136	630	430	68.36	1.30
B 5531	1410	119	83	225	105	86	148	618	499	80.70	1.21
B 5533	1440	267	161	301	118	113	196	959	692	72.16	1.05
B 5535	1470	277	166	287	87	99	166	916	639	69.75	0.89
B 5537	1500	1181	415	474	97	122	159	2290	1109	48.45	0.80
B 5539	1530	173	26	45	12	52	143	307	134	43.79	0.23
B 5541	1560	269	282	620	93	172	130	1436	1167	81.28	0.54
B 5543	1590	79	42	290	64	124	117	599	520	86.80	0.52
B 5545	1620	378	201	402	90	164	228	1235	857	69.39	0.55
B 5547	1650	693	633	859	189	282	333	2655	1963	73.91	0.67
B 5549	1680	2364	2015	2857	801	933	1190	8970	6606	73.65	0.86
B 5551	1710	1177	1043	1680	454	592	662	4947	3769	76.20	0.77
B 5553	1740	1745	2247	2981	504	761	786	8239	6493	78.82	0.66

TABLE I b.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN OCLUDED

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5555	1770	382	457	948	178	483	737	2448	2066	84.38	0.37
B 5557	1800	2384	6511	11974	1886	5522	4215	28278	25893	91.57	0.34
B 5558	1815	7264	14105	24070	4447	13357	13811	63243	55979	88.51	0.33
B 5559	1830	25040	27478	26773	3636	10268	8814	93195	68155	73.13	0.35
B 5560	1845	48552	41306	33125	3507	8854	6803	135344	86793	64.13	0.40
B 5561	1860	32616	29251	18722	1789	4607	3933	86984	54368	62.50	0.39
B 5562	1875	3726	4312	5407	904	2557	4243	16906	13180	77.96	0.35
B 5563	1890	193	1264	3615	696	1854	2464	7621	7428	97.47	0.38
B 5564	1905	1465	2020	2722	497	1163	1691	7866	6402	81.38	0.43
B 5565	1920	2804	3848	7380	1744	5007	12447	20783	17980	86.51	0.35
B 5566	1935	341	728	2711	671	2022	6393	6472	6131	94.73	0.33
B 5567	1950	653	351	1887	632	2064	11883	5587	4935	88.32	0.31
B 5568	1965	1303	1822	3767	938	2827	17743	10656	9354	87.78	0.33
B 5569	1980	1915	1614	4661	1890	5413	36868	15493	13578	87.64	0.35
B 5570	1995	1891	2592	7378	2995	7884	45604	22740	20849	91.69	0.38
B 5571	2010	608	602	1889	583	1796	18840	5478	4870	88.89	0.32
B 5572	2025	766	362	1369	546	1691	20758	4734	3968	83.81	0.32
B 5573	2040	3228	4519	6172	1238	3619	23384	18776	15548	82.81	0.34
B 5574	2055	919	898	2113	647	1985	19714	6562	5642	85.99	0.33
B 5575	2070	4821	3935	3686	714	2033	17023	15189	10369	68.26	0.35
B 5576	2085	6819	6622	5850	758	2157	8556	22206	15387	69.29	0.35
B 5577	2100	445	916	1543	257	763	4215	3924	3479	88.65	0.34
B 5578	2115	346	848	1428	193	530	2018	3345	2999	89.66	0.36
B 5579	2130	399	245	548	88	202	647	1482	1084	73.12	0.44

TABLE. I b.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS IN OCLUDED

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5580	2145	268	74	271	56	155	982	823	555	67.45	0.36
B 5581	2160	831	232	473	135	300	4554	1971	1140	57.85	0.45

TABLE I c.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS SUMMATION

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5505	1020	21355	3668	4061	944	1811	1821	31839	10484	32.93	0.52
B 5507	1050	97774	13441	7803	1213	1987	2009	122218	24444	20.00	0.61
B 5509	1080	56857	5431	3448	808	783	764	67326	10470	15.55	1.03
B 5511	1110	8661	1205	943	273	1301	358	12383	3722	30.06	0.21
B 5513	1140	3731	216	251	88	90	305	4376	645	14.74	0.97
B 5515	1170	71644	2033	700	207	155	284	74739	3094	4.14	1.34
B 5517	1200	25972	1340	901	212	256	421	28682	2709	9.45	0.83
B 5520	1245	33707	817	392	124	87		35127	1420	4.04	1.42
B 5521	1260	9139	260	158	54	28		9638	500	5.19	1.91
B 5523	1290	48915	1403	507	169	69	186	51063	2148	4.21	2.45
B 5525	1320	73143	2593	1074	357	176	235	77343	4200	5.43	2.03
B 5527	1350	76518	2331	883	320	160	238	80212	3694	4.61	2.00
B 5531	1410	20805	2194	1168	449	238	267	24854	4049	16.29	1.89
B 5533	1440	52280	2942	1487	503	338	299	57550	5270	9.16	1.49
B 5535	1470	75206	4104	1676	426	301	225	81713	6507	7.96	1.42
B 5537	1500	2255	450	483	97	122	159	3408	1153	33.83	0.80
B 5539	1530	181	26	68	12	52	143	338	157	46.48	0.23
B 5541	1560	1623	463	699	93	172	130	3050	1427	46.78	0.54
B 5543	1590	143	103	442	64	124	117	876	733	83.68	0.52
B 5545	1620	29493	2148	1366	301	365	433	33674	4181	12.41	0.82
B 5547	1650	15654	2221	1634	382	452	458	20344	4690	23.05	0.84
B 5549	1680	37725	6191	4958	1374	1332	1407	51580	13855	26.86	1.03
B 5551	1710	4131	1318	1788	454	592	662	8284	4152	50.13	0.77
B 5553	1740	24048	5618	4026	673	941	958	35306	11257	31.89	0.72

TABLE I c.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS SUMMATION

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5555	1770	3425	1348	1406	258	539	737	6976	3552	50.91	0.48
B 5557	1800	23049	15893	16894	2569	7015	4908	65420	42371	64.77	0.37
B 5558	1815	56120	35651	35017	6052	16994	15988	149834	93714	62.55	0.36
B 5559	1830	55342	41531	34935	4542	12201	10021	148549	93208	62.75	0.37
B 5560	1845	102184	64965	41908	4299	10374	7574	223730	121546	54.33	0.41
B 5561	1860	79203	48347	25290	2793	6432	6038	162066	82862	51.13	0.43
B 5562	1875	26555	9068	7004	1167	2938	4631	46733	20178	43.18	0.40
B 5563	1890	475	1789	4082	783	1984	2564	9113	8637	94.78	0.39
B 5564	1905	26241	6741	4732	949	1788	2624	40451	14209	35.13	0.53
B 5565	1920	32691	8212	10214	2646	6175	14424	59938	27248	45.46	0.43
B 5566	1935	665	1216	3460	890	2469	7848	8700	8034	92.35	0.36
B 5567	1950	653	351	1887	632	2064	11883	5587	4935	88.32	0.31
B 5568	1965	16811	7412	8434	2084	5020	21668	39762	22950	57.72	0.42
B 5569	1980	17935	7077	10772	3468	8459	41700	47712	29777	62.41	0.41
B 5570	1995	10069	7180	13175	4524	10790	50629	45738	35669	77.99	0.42
B 5571	2010	608	602	1889	583	1796	18840	5478	4870	88.89	0.32
B 5572	2025	1270	1109	2700	941	2548	23409	8569	7299	85.17	0.37
B 5573	2040	43624	18323	16492	3546	8181	31716	90165	46541	51.62	0.43
B 5574	2055	8781	4937	7026	2133	5166	27174	28043	19262	68.69	0.41
B 5575	2070	47168	16447	10196	2073	4406	22056	80289	33121	41.25	0.47
B 5576	2085	51053	21037	11342	1578	3375	10187	88385	37332	42.24	0.47
B 5577	2100	923	1364	1919	330	899	4436	5435	4512	83.02	0.37
B 5578	2115	24194	13188	8040	1190	1781	3311	48393	24199	50.01	0.67
B 5579	2130	1400	1902	2235	392	683	1353	6612	5212	78.82	0.57

Project no.: 05.1747.00
Well ident.: 7121/7-1
DATE : 8 - 10 - 84.

IKU

TABLE I c.

CONCENTRATION (ul Gas / kg dry Rock) OF C1 - C5+ HYDROCARBONS SUMMATION

IKU no.	DEPTH m	C1	C2	C3	iC4	nC4	C5+	SUM C1-C4	SUM C2-C4	WET-NESS (%)	iC4 / nC4
B 5580	2145	299	128	351	56	153	982	988	689	69.74	0.36
B 5581	2160	6501	3536	5313	1325	1878	7511	18554	12053	64.96	0.71

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC / GSA colour code	Lithology
B-5505	1005-20	0.89 (N4-N3)	*80% Claystone, medium dark grey-dark grey, silty, micromicaceous, occasionally micro-pyritic, glauconitic, slightly calcareous 20% Siltstone, light-medium grey, sandy, slightly micromicaceous, occasionally micropyritic, very glauconitic, calcareous Sm.am. Calcite; Gypsum
B-5507	1035-50	0.84 (N4-N3)	*90% Claystone, medium dark grey-dark grey, very silty, as above 10% Siltstone, light-medium grey, as above Sm.am. Calcite; Gypsum
B-5509	1065-85	0.82 (N4-N3)	*90% Claystone, medium dark grey-dark grey, silty, as above 10% Siltstone, light-medium grey, as above Sm.am. Calcite/Siderite; Gypsum
B-5511	1095-1110	0.78 (N4-N3)	*100% Claystone, medium dark grey-dark grey, as above Sm.am. Calcite/Siderite; Gypsum; Pyrite
B-5513	1125-40	0.82 (N4-N3)	*90% Claystone, medium dark grey-dark grey, as above 10% Siltstone, light-medium grey, slightly micromicaceous, glauconitic, calcareous Sm.am. Calcite/Siderite; Gypsum
B-5515	1155-70	0.70 (N4-N3)	*100% Claystone, medium dark grey-dark grey, as above Sm.am. Calcite/Siderite; Gypsum; Siltstone

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC /GSA colour code	Lithology
B-5517	1185-1200	0.63 (N4-N3)	*100% Claystone, medium dark grey-dark grey, as above Sm.am. Siltstone; Gypsum; Siderite
B-5520	1230-45	0.54 (N4)	*100% Claystone, medium dark grey, slightly silty, slightly micromicaceous Sm.am. Calcite/Siderite; Gypsum; Pyrite
B-5521	1245-60	0.65 (N4)	*100% Claystone, medium dark grey, slightly silty, slightly micromicaceous Sm.am. Calcite/Siderite; Gypsum; Pyrite
B-5523	1275-90	0.79 (N4)	*100% Claystone, medium dark grey, as above Sm.am. Calcite/Siderite; Gypsum
B-5525	1305-20	0.74 (N4-N3)	*100% Claystone, medium dark grey-dark grey, silty, micromicaceous Sm.am. Calcite/Siderite; Gypsum
B-5527	1335-50	0.87 (N4-N3)	*100% Claystone, medium dark grey-dark grey, very silty, micromicaceous, slightly micropyritic Sm.am. Calcite/Siderite
B-5531	1395-1410	1.00 (N4-N3)	*100% Claystone, medium dark grey-dark grey, very silty, as above
B-5533	1425-40	0.94 (N4-N3)	*100% Claystone, (medium) dark grey, silty, micromicaceous, occasionally micropyritic Sm.am. Siderite/Calcite; Gypsum

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Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC / GSA colour code	Lithology
B-5535	1455-70	0.96 (N4-N3)	*100% Claystone, (medium) dark grey, silty, as above Sm.am. Siderite/Calcite; Gypsum
B-5537	1485-1500	0.96 (N4-N3)	*100% Claystone, (medium) dark grey, silty, as above Sm.am. Calcite/Siderite
B-5539	1515-30		90% Casing cement, light grey, containing minute black specks 10% Claystone, (medium) dark grey, as above
B-5541	1545-60	1.06 (N3)	*100% Claystone, dark grey, silty, micromicaceous, partly micropyritic Sm.am. Siderite; Limestone
B-5543	1575-90	0.96 (N3)	*100% Claystone, dark grey, silty, as above Sm.am. Siderite; Limestone
B-5545	1605-20	0.80 (N3)	*90% Claystone, dark grey, silty, micromicaceous, occasionally micropyritic, partly calcareous 10% Limestone, medium grey-dark grey, argillaceous
B-5547	1635-50	1.25 (N3)	*100% Claystone, dark grey, silty, micromicaceous, partly micropyritic Sm.am. Siderite/Limestone; Trace of paint
B-5549	1665-80	1.74 (N3)	*100% Claystone, dark grey, silty, as above Sm.am. Siderite/Limestone

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC /GSA colour code	Lithology
B-5551	1695-1710	1.22 (N3)	*90% Claystone, dark grey, silty, as above 10% Siderite, dusky yellowish brown-dark grey, argillaceous Sm.am. Limestone
B-5553	1725-40	1.20 (N3)	*90% Claystone, dark grey, silty micromicaceous, occasionally micropyritc 10% Siderite/Dolomite, dusky yellowish brown-medium grey, argillaceous Sm.am.
B-5555	1755-70	0.98 (N4-N3)	*40% Claystone, medium dark grey-dark grey, occasionally greyish black, silty, micro-micaceous, occasionally micropyritic
		0.03 (10R3/4)	*40% Claystone, dark reddish brown, micro-micaceous, slightly calcareous 10% Siderite/Dolomite 10% Claystone, (medium grey-olive grey) Trace of paint
B-5557	1785-1800	3.29 (5YR3/1-5YR2/1)	*80% Claystone, dark brownish grey-brownish black, silty, micromicaceous, slightly micropyritic 20% Dolomite, medium grey Sm.am. Claystone (medium grey-olive grey); Pyrite; Steel
B-5558	1800-15	3.96 (5YR3/1-5YR2/1)	*100% Claystone, dark brownish grey-brownish black, silty, micromicaceous, slightly micropyritic Trace Claystone (light grey)

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC /GSA colour code	Lithology
B-5559	1815-30	6.69 (5YR2/1)	*100% Claystone, brownish black, silty, micromicaceous, micropyritic Sm.am. Claystone (reddish brown)
B5560	1830-45	9.96 (5YR2/1)	*100% Claystone, brownish black, as above
B-5561	1845-60	10.47 (N3-5YR2/1)	*60% Claystone, dark grey-brownish black, micromicaceous, partly micropyritic 40% Sandstone, light grey-(light olive grey), very fine-medium Sm.am. Dolomite/Siderite; Pyrite
B-5562	1860-75	1.51 (N4,occ.N2)	60% Sandstone, as above *40% Claystone, medium dark grey-occasionally greyish black, silty, micromicaceous, occasionally micropyritic Sm.am. Claystone (reddish brown)
B-5563	1875-90	1.31 (N4,occ.N2)	*90% Claystone, medium dark grey-occasionally greyish black, as above 10% Sandstone/Sand, as above Sm.am. Claystone (reddish brown); Siderite
B-5564	1890-1905	2.04 (N4-N3) 3.37 (N2)	*50% Claystone, medium dark grey-dark grey, silty, micromicaceous *40% Claystone, greyish black, silty, slightly micromicaceous 10% Sandstone, light grey-light olive grey, very fine-fine, slightly micromicaceous Sm.am. Siderite; Claystone (reddish brown)

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC /GSA colour code		Lithology
B-5565	1905-20	1.27 (N4-N3)	*40%	Claystone, medium dark grey-dark grey, as above
		3.42	30%	Claystone, greyish black, as above
		(N2)	30%	Sandstone, as above
			Sm.am.	Claystone, (reddish brown)
B-5566	1920-35	1.30 (N4-N3)	*40%	Claystone, medium dark grey-dark grey, as above
		5.03	*30%	Claystone, greyish black, as above
		(N2)	30%	Sandstone, as above
			Sm.am.	Claystone (reddish brown)
B-5567	1935-50		60%	Sandstone, as above
			20%	Claystone, medium dark grey-dark grey, as above, cavings
			20%	Claystone, greyish black, as above, cavings
			Sm.am.	Claystone (reddish brown)
B-5568	1950-65		100%	Sandstone, as above
			Sm.am.	Claystone (medium dark grey-greyish black) Claystone (reddish brown), cavings
B-5569	1965-80		100%	Sandstone, light olive grey very fine-medium micromicaceous
			Sm.am.	Claystone (medium dark grey-greyish black); Claystone (reddish brown), cavings
B-5570	1980-95		100%	Sandstone, light olive grey, as above
			Sm.am.	Claystone, (medium dark grey-greyish black); Claystone (reddish brown), cavings

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC/GSA colour code	Lithology
B-5571	1995-2010		90% Sandstone, light olive grey, as above 10% Claystone, medium dark grey-greyish black, cavings Sm.am. Siltstone (dark brownish grey, very micromicaceous)
B-5572	2010-25	3.25 (5YR3/1)	90% Sandstone, light olive grey, clear, as above 10% Siltstone, dark brownish grey, very micromicaceous, argillaceous
B-5573	2025-40		100% Sand/Sandstone, light olive grey, clear, very fine-medium Sm.am. Coal; Claystone (dark grey)
B-5574	2040-55		100% Sand/Sandstone, as above Sm.am. Claystone (dark grey); Trace of Coal
B-5575	2055-70	4.92 (N4-N3-5YR4/1)	90% Sand/Sandstone, as above 10% Claystone (medium) dark grey-brownish grey, partly very silty Sm.am. Coal
B-5576	2070-85	3.54 (N4-N3-5YR4/1)	80% Sand/Sandstone, as above 10% Claystone, (medium) dark grey-brownish grey, as above 10% Coal Sm.am. Siderite
B-5577	2085-2100	1.42 (N4-N3)	*60% Claystone, medium dark grey-dark grey, very silty, micromicaceous 40% Sandstone, light olive grey, very fine-medium, partly very argillaceous Sm.am. Coal; Siderite

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC /GSA colour code		Lithology
B-5578	2100-15	1.26 (N4-N3)	*70%	Claystone, medium dark grey-dark grey, as above
			30%	Sandstone, as above
			Sm.am.	Coal; Siderite
B-5579	2115-30	1.08 (N4-N3)	*60%	Claystone, medium dark grey-dark grey, as above
			40%	Sandstone, as above
			Sm.am.	Siderite; trace of Coal
B-5580	2130-45		60%	Sandstone, light olive grey-white, very fine-medium, partly argillaceous, slightly micaceous
		1.12 (N4-N3)	*40%	Claystone, medium dark grey-dark grey, as above
			Sm.am.	Siderite; Claystone (reddish brown); trace of Coal
B-5581	2145-60		70%	Sandstone, as above
		0.98 (N4-N3)	*30%	Claystone, medium dark grey-dark grey
			Trace of Coal	

Sidewall cores

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC	Lithology
B-5606	825	0.39 (N6)	Claystone, medium light grey
B-5608	895	0.17 (5Y4/1-56Y6/1)	Claystone, olive grey-greenish grey, silty, slightly micromicaceous, glauconitic
B-5610	930	0.27 (56Y6/1)	Siltstone, greenish grey, sandy, argillaceous, very glauconitic, calcareous
B-5612	975	0.59 (N5)	Claystone, medium grey, micromicaceous, calcareous
B-5614	1031	0.86 (N4-N3)	Claystone, medium dark grey-dark grey, silty, micromicaceous
B-5616	1089	0.84 (N4-N3)	Claystone, medium dark grey-dark grey, as above
B-5618	1150	0.51 (N4-N3)	Claystone, medium dark grey-dark grey, as above
B-5620	1200	0.38 (N4-N3)	Claystone, medium dark grey-dark grey slightly micromicaceous
B-5622	1254	0.62 (N4)	Claystone, medium dark grey, slightly micromicaceous
B-5624	1293	0.87 (N4)	Claystone, medium dark grey, as above
B-5626	1353	0.63 (N4)	Claystone, medium dark grey, slightly silty, slightly micromicaceous, occ. micropyritic

Sidewall cores

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC	Lithology
B-5627	1405	1.09 (N4-N3)	Claystone, medium dark grey-dark grey, silty, slightly micromicaceous
B-5629	1451	1.06 (N4-N3)	Claystone, medium dark grey-dark grey, as above
B-5631	1498.50	0.72 (N3)	Claystone, dark grey, slightly micromicaceous, occ. micropyritic
B-5634	1601	0.27 (N5-5Y4/1)	Claystone, medium grey-olive grey, silty slightly micromicaceous
B-5636	1658	1.03 (N4-N3)	Claystone, (medium) dark grey, micro-micaceous, occ. micropyritic
B-5638	1699	0.63 (N4-N3)	Claystone, medium grey-medium dark grey, slightly micromicaceous
B-5639	1720	1.03 (N4-N3)	Claystone, (medium) dark grey, micromicaceous
B-5640	1725	1.93 (N3)	Claystone, dark grey, silty, slightly micromicaceous, slightly micropyritic
B-5642	1730	0.93 (N4-N3)	Claystone, medium dark grey-dark grey, silty, slightly micromicaceous, slightly micropyritic
B-5643	1738	2.86 (5YR3/1)	Claystone, dark brownish grey, silty, slightly micromicaceous, micropyritic
B-5644	1747	1.35 (5YR3/1)	Claystone, dark brownish grey, silty, micromicaceous, slightly micropyritic

Sidewall cores

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC	Lithology
B-5645	1752	0.96 (N3)	Claystone, dark grey, slightly micromicaceous, occ. micropyritic
B-5646	1767	0.09 (5YR6/1)	Claystone, light brownish grey, slightly micromicaceous, calcareous
B-5647	1775	0.02 (5YR6/1)	Claystone, light brownish grey, as above
B-5648	1788	0.19 (5YR6/1)	Claystone, light brownish grey, micromicaceous
B-5649	1800	3.51 (5YR3/1-2/1)	Claystone, dark brownish grey-brownish black, silty, micromicaceous, micropyritic
B-5650	1839	9.77 (5YR3/1-2/1)	Claystone, dark brownish grey-brownish black, as above
B-5651	1843	1364 (5YR3/1-2/1)	Claystone, dark brownish grey-brownish black, as above
B-5652	1847	9.12 (5YR3/1-2/1)	Claystone, dark brownish grey-brownish black, as above
B-5654	1848	0.0 (5YR6/1)	Claystone, light brownish grey-slightly micromicaceous
B-5655	1968.5	17.82 (5YR2/1)	Claystone, brownish black, silty, containing coal particles
B-5656	2007.50	0.29 (5YR6/1)	Claystone, light brownish grey, very micaceous

Sidewall cores

Lithology and Total Organic Carbon measurements

TABLE NO.: 2
WELL NO.: 7121/7-1

Sample	Depth (m)	TOC	Lithology
B-5658	2080	1.25 (N4-5YR4/1)	Claystone, medium dark grey-brownish grey, silty micromicaceous
B-5659	2117.70	0.10 (5Y6/1-5YR4/1)	Claystone, light olive grey-brownish grey, micromicaceous
B-5660	2128.5	0.48 (N5-5Y4/1)	Claystone, medium grey-olive grey, silty
B-5662	2135	0.30 (5Y6/1)	Claystone, light olive grey, micromicaceous

TABLE 3

D A T A F R O M R O C K E V A L P Y R O L Y S I S

IKU No.	DEPTH m/ft	S1 (mg/g ROCK)	S2 (mg/g ROCK)	S3 (mg/g ROCK)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYGEN INDEX (mg/g TOC)	PETROLEUM POTENTIAL S1+S2	PROD. INDEX S1/S1+S2	TEMP. MAX (C)
B 5606	825	****	****	****	0.39	*****	****	******	******	***
		SWC; Clst med lt gy								
B 5608	895	****	****	****	0.17	*****	****	******	******	***
		SWC; Clst olv gy-gn gy								
B 5610	930	****	****	****	0.27	*****	****	******	******	***
		SWC; Sltst								
B 5612	975	0.15	0.17	0.45	0.59	29	76	0.32	0.47	426
		SWC; Clst med gy								
B 5505	1020	0.06	0.82	0.32	0.89	92	36	0.88	0.07	431
		Clst med dk gy - dk gy								
B 5614	1031	0.08	0.62	0.36	0.86	72	42	0.70	0.11	428
		SWC; Clst med dk gy-dk gy								
B 5507	1050	0.05	0.63	0.24	0.84	75	29	0.68	0.07	428
		Clst med dk gy - dk gy								
B 5509	1085	0.07	0.38	0.30	0.82	46	37	0.45	0.16	430
		Clst med dk gy - dk gy								
B 5616	1089	0.06	0.45	0.31	0.84	54	37	0.51	0.12	429
		SWC; Clst med dk gy-dk gy								
B 5511	1110	0.04	0.44	0.33	0.78	56	42	0.48	0.08	429
		Clst med dk gy - dk gy								
B 5513	1140	0.03	0.43	0.69	0.82	52	84	0.46	0.07	426
		Clst med dk gy - dk gy								
B 5618	1150	****	****	****	0.51	*****	****	******	******	***
		SWC; Clst med dk gy-dk gy								
B 5515	1170	0.05	0.33	0.24	0.70	47	34	0.38	0.13	426
		Clst med dk gy - dk gy								
B 5517	1200	0.01	0.17	0.17	0.63	27	27	0.18	0.06	430
		Clst med dk gy - dk gy								
B 5620	1200	****	****	****	0.38	*****	****	******	******	***
		SWC; Clst med dk gy-dk gy								
B 5520	1245	****	****	****	0.54	*****	****	******	******	***
		Clst med dk gy								
B 5622	1254	0.04	0.11	0.29	0.62	18	47	0.15	0.27	428
		SWC; Clst med dk gy								
B 5521	1260	0.06	0.12	0.18	0.65	18	28	0.18	0.33	414
		Clst med dk gy								
B 5523	1290	0.06	0.27	0.22	0.79	34	28	0.33	0.18	424
		Clst med dk gy								
B 5624	1292	0.04	0.24	0.77	0.87	28	89	0.28	0.14	431
		SWC; Clst med dk gy								
B 5525	1320	0.04	0.26	0.15	0.74	35	20	0.30	0.13	430
		Clst med dk gy - dk gy								
B 5527	1350	0.14	0.26	0.39	0.87	30	45	0.40	0.35	433
		Clst med dk gy - dk gy								
B 5626	1353	0.06	0.11	0.12	0.63	17	19	0.17	0.35	433
		SWC; Clst med dk gy								

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TABLE 3

D A T A   F R O M   R O C K   E V A L   P Y R O L Y S I S

IKU No.	DEPTH m/ft	S1 (mg/g ROCK)	S2 (mg/g ROCK)	S3 (mg/g ROCK)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYGEN INDEX (mg/g TOC)	PETROLEUM POTENTIAL S1+S2	PROD. INDEX S1/(S1+S2)	TEMP. MAX (C)
B 5627	1405	0.11	0.56	0.50	1.09	51	46	0.67	0.16	427
		SWC; Clst med dk gy-dk gy								
B 5531	1410	0.10	0.55	0.33	1.00	55	33	0.65	0.15	432
		Clst med dk gy - dk gy								
B 5533	1440	0.10	0.46	0.32	0.94	49	34	0.56	0.18	432
		Clst (med) dk gy								
B 5629	1451	0.02	0.38	0.32	1.06	36	30	0.40	0.05	429
		SWC; Clst med dk gy-dk gy								
B 5535	1470	0.36	0.50	0.51	0.96	52	53	0.86	0.42	428
		Clst (med) dk gy								
B 5631	1498.50	0.07	0.30	0.25	0.72	42	35	0.37	0.19	431
		SWC; Clst dk gy								
B 5537	1500	0.06	0.36	0.34	0.96	38	35	0.42	0.14	433
		Clst (med) dk gy								
B 5541	1560	0.09	0.37	0.45	1.06	35	42	0.46	0.20	433
		Clst dk gy								
B 5543	1590	0.15	0.19	0.26	0.96	20	27	0.34	0.44	422
		Clst dk gy								
B 5634	1601	****	****	****	0.27	*****	****	******	******	***
		SWC; Clst med gy-olv gy								
B 5545	1620	0.13	0.32	0.29	0.80	40	36	0.45	0.29	411
		Clst dk gy								
B 5547	1650	0.18	0.44	0.27	1.25	35	22	0.62	0.29	437
		Clst dk gy								
B 5636	1658	0.16	0.31	0.52	1.03	30	50	0.47	0.34	426
		SWC; Clst (med) dk gy								
B 5549	1680	0.31	0.89	0.36	1.74	51	21	1.20	0.26	445
		Clst dk gy								
B 5638	1699	0.09	0.17	0.54	0.61	28	89	0.26	0.35	438
		SWC: Clst med gy- med dk gy								
B 5551	1710	0.12	1.08	0.28	1.22	89	23	1.20	0.10	439
		Clst dk gy								
B 5639	1720	0.16	0.26	0.66	1.03	25	64	0.42	0.38	431
		SWC; Clst (med) dk gy								
B 5640	1725	0.14	0.76	0.62	1.93	39	32	0.90	0.16	428
		SWC: Clst dk gy								
B 5642	1730	0.14	0.37	0.42	0.93	40	45	0.51	0.27	433
		SWC; Clst med dk gy-dk gy								
B 5643	1738	0.27	1.55	0.65	2.86	54	23	1.82	0.15	433
		SWC; Clst dk brn gy								
B 5553	1740	0.19	0.97	0.20	1.20	81	17	1.16	0.16	437
		Clst dk gy								
B 5644	1747	0.36	0.43	0.46	1.35	32	34	0.79	0.46	437
		SWC; Clst dk brn gy								
B 5645	1752	0.11	0.18	0.30	0.96	19	31	0.29	0.38	436
		SWC: Clst dk gy								

TABLE 3

DATA FROM ROCK EVAL PYROLYSIS

IKU No.	DEPTH m/ft	S1 (mg/g ROCK)	S2 (mg/g ROCK)	S3 (mg/g ROCK)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYGEN INDEX (mg/g TOC)	PETROLEUM POTENTIAL S1+S2	PROD. INDEX S1/S1+S2	TEMP. MAX (C)
B 5646	1767	****	****	****	0.09	*****	****	******	******	***
		SWC; Clst lt brn gy								
B 5555	1770	****	****	****	0.03	*****	****	******	******	***
		Clst rdsh brn								
B 5555	1770	0.10	0.49	0.26	0.98	50	27	0.59	0.17	438
		Clst med dk gy - dk gy								
B 5647	1775	****	****	****	0.02	*****	****	******	******	***
		SWC; Clst lt brn gy								
B 5648	1788	****	****	****	0.19	*****	****	******	******	***
		SWC; Clst lt brn gy								
B 5557	1800	0.88	11.91	0.21	3.29	362	6	12.79	0.07	430
		Clst dk brn gy - brn blk								
B 5649	1800	1.22	13.10	0.42	3.51	373	12	14.32	0.09	427
		SWC; Clst dk brn gy-brn bl								
B 5558	1815	1.52	18.05	0.42	3.96	456	11	19.57	0.08	430
		Clst dk brn gy - brn blk								
B 5559	1830	3.07	27.56	0.70	6.69	412	10	30.63	0.10	428
		Clst brn blk								
B 5650	1839	5.39	32.32	0.67	9.77	331	7	37.71	0.14	426
		SWC; Clst dk brn gy-brn bl								
B 5651	1843	7.28	44.78	1.23	13.64	328	9	52.06	0.14	424
		SWC; Clst dk brn gy-brn bl								
B 5560	1845	5.18	39.26	0.69	9.96	394	7	44.44	0.12	428
		Clst brn blk								
B 5652	1847	4.98	25.86	1.72	9.12	284	19	30.84	0.16	424
		SWC; Clst dk brn gy-brn bl								
B 5654	1848	****	****	****	0.00	*****	****	******	******	***
		SWC; Clst lt brn gy								
B 5561	1860	5.54	44.76	0.91	10.47	428	9	50.30	0.11	427
		Clst dk gy - brn blk								
B 5562	1875	0.33	1.94	0.96	1.51	128	64	2.27	0.15	437
		Clst med dk gy - gy blk								
B 5563	1890	0.12	0.73	0.73	1.31	56	56	0.85	0.14	437
		Clst med dk gy - gy blk								
B 5564	1905	0.26	2.37	0.69	2.04	116	34	2.63	0.10	437
		Clst med dk gy - dk gy								
B 5564	1905	0.52	6.33	0.70	3.37	188	21	6.85	0.08	435
		Clst gy blk								
B 5565	1920	0.17	0.78	0.78	1.27	61	61	0.95	0.18	438
		Clst med dk gy - dk gy								
B 5565	1920	0.53	6.13	0.69	3.42	179	20	6.66	0.08	434
		Clst gy blk								
B 5566	1935	0.33	1.80	0.83	1.30	138	64	2.13	0.15	435
		Clst med dk gy - dk gy								
B 5566	1935	1.63	14.40	0.79	5.03	286	16	16.03	0.10	430
		Clst gy blk								

IKU

TABLE 3

DATA FROM ROCK EVAL PYROLYSIS

IKU No.	DEPTH m/ft	S1 (mg/g ROCK)	S2 (mg/g ROCK)	S3 (mg/g ROCK)	TOC (%)	HYDR. INDEX (mg/g TOC)	OXYGEN INDEX (mg/g TOC)	PETROLEUM POTENTIAL S1+S2	PROD. INDEX S1/S1+S2	TEMP. MAX (C)
5655	1968.50	8.94	72.16	1.88	17.82	405	11	81.10	0.11	435
		SWC; Clst brn bl								
5656	2007.30	****	****	****	0.29	*****	****	******	******	***
		SWC; Clst lt brn gy								
5572	2025	2.19	8.94	0.98	3.25	275	30	11.13	0.20	434
		Sltst dk brn gy								
5575	2070	1.26	10.06	0.79	4.92	204	16	11.32	0.11	439
		Clst (med) dk gy - brn gy								
5658	2080	0.23	0.93	0.84	1.25	74	67	1.16	0.20	441
		SWC; Clst med dk gy-brn gy								
5576	2085	1.23	7.77	0.80	3.54	219	23	9.00	0.14	439
		Clst (med) dk gy - brn gy								
5577	2100	0.30	1.55	0.68	1.42	109	48	1.85	0.16	440
		Clst med dk gy - dk gy								
5578	2115	0.18	1.12	0.61	1.26	89	48	1.30	0.14	440
		Clst med dk gy - dk gy								
5659	2117.70	****	****	****	0.10	*****	****	******	******	***
		SWC; Clst lt olv gy-brn gy								
5660	2128.50	****	****	****	0.48	*****	****	******	******	***
		SWC; Clst Clst med gy-olv gy								
5579	2130	0.16	1.06	0.67	1.08	98	62	1.22	0.13	440
		Clst med dk gy - dk gy								
5662	2135	****	****	****	0.30	*****	****	******	******	***
		SWC; Clst lt olv gy								
5580	2145	0.24	1.04	0.68	1.12	93	61	1.28	0.19	441
		Clst med dk gy - dk gy								
5581	2160	0.30	0.70	0.54	0.98	71	55	1.00	0.30	439
		Clst med dk gy - dk gy								

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TABLE : 4

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

IKU-No	DEPTH (m)	Rock Extr. (g)	EOM (mg)	Sat. (mg)	Aro. (mg)	HC (mg)	Non HC (mg)	TOC (%)
B 5557	1800 Clst dk brn gy-brn blk	32.6	69.3	7.3	11.8	19.1	50.2	3.29
B 5559	1830 Clst brn blk	35.9	180.0	24.2	37.0	61.2	118.8	6.69
B 5651	1843 SWC Clst dk brn gy-brn blk	9.9	137.3	10.1	32.6	42.7	94.6	13.64
B 5652	1847 SWC Clst dk brn gy-brn blk	7.2	80.4	7.0	21.5	28.4	52.0	9.12
B 5562	1875 Clst med dk gy-gy blk	22.5	19.3	2.4	4.6	7.0	12.3	1.51
B 5564	1905 Clst gy blk	9.2	22.5	3.5	3.5	7.0	15.5	3.37
B 5566	1935 Clst gy blk	8.7	25.9	11.0	4.0	15.0	10.9	5.03
B 5655	1968.50 SWC Clst brn blk	9.1	91.7	7.6	22.1	29.6	62.1	17.82
B 5576	2085 Clst (med) dk gy-brn gy	13.9	61.0	11.0	13.2	24.2	36.8	3.54
B 5580	2145 Clst med dk gy-dk gy	12.5	5.0	1.7	1.4	3.1	1.9	1.12

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TABLE : 5

WEIGHT OF EOM AND CHROMATOGRAPHIC FRACTIONS

(Weight ppm OF rock)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
B 5557	1800	2127	225	361	586	1541
	Clst dk brn gy-brn blk					
B 5559	1830	5010	675	1029	1703	3306
	Clst brn blk					
B 5651	1843	13869	1018	3297	4315	9554
	SWC Clst dk brn gy-brn blk					
B 5652	1847	11245	973	3004	3978	7267
	SWC Clst dk brn gy-brn blk					
B 5562	1875	859	107	203	310	549
	Clst med dk gy-gy blk					
B 5564	1905	2438	377	377	754	1684
	Clst gy blk					
B 5566	1935	2963	1263	453	1716	1247
	Clst gy blk					
B 5655	1968.50	10110	834	2434	3268	6842
	SWC Clst brn blk					
B 5576	2085	4398	796	952	1748	2650
	Clst (med) dk gy-brn gy					
B 5580	2145	399	134	115	249	150
	Clst med dk gy-dk gy					

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TABLE : 6

CONCENTRATION OF EOM AND CHROMATOGRAPHIC FRACTIONS

(mg/g TOC)

IKU-No	DEPTH (m)	EOM	Sat.	Aro.	HC	Non HC
B 5557	1800	64.7	6.8	11.0	17.8	46.9
	Clst dk brn gy-brn blk					
B 5559	1830	74.9	10.1	15.4	25.5	49.4
	Clst brn blk					
B 5651	1843	101.7	7.5	24.2	31.6	70.0
	SWC Clst dk brn gy-brn blk					
B 5652	1847	123.3	10.7	32.9	43.6	79.7
	SWC Clst dk brn gy-brn blk					
B 5562	1875	56.9	7.1	13.4	20.5	36.4
	Clst med dk gy-gy blk					
B 5564	1905	72.3	11.2	11.2	22.4	50.0
	Clst gy blk					
B 5566	1935	58.9	25.1	9.0	34.1	24.8
	Clst gy blk					
B 5655	1968.50	56.7	4.7	13.7	18.3	38.4
	SWC Clst brn blk					
B 5576	2085	124.2	22.5	26.9	49.4	74.9
	Clst (med) dk gy-brn gy					
B 5580	2145	35.6	12.0	10.3	22.2	13.4
	Clst med dk gy-dk gy					

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TABLE : 7

COMPOSITION IN % OF MATERIAL EXTRACTED FROM THE ROCK

IKU-No	DEPTH (m)	Sat / EOM	Aro / EOM	HC / EOM	SAT / Aro	Non HC / EOM	HC / Non HC
B 5557	1800 Clst dk brn gy-brn blk	10.6	17.0	27.5	62.2	72.5	38.0
B 5559	1830 Clst brn blk	13.5	20.5	34.0	65.6	66.0	51.5
B 5651	1843 SWC Clst dk brn gy-brn blk	7.3	23.8	31.1	30.9	68.9	45.2
B 5652	1847 SWC Clst dk brn gy-brn blk	8.7	26.7	35.4	32.4	64.6	54.7
B 5562	1875 Clst med dk gy-gy blk	12.4	23.6	36.1	52.6	63.9	56.4
B 5564	1905 Clst gy blk	15.5	15.5	30.9	100.0	69.1	44.8
B 5566	1935 Clst gy blk	42.6	15.3	57.9	278.8	42.1	137.6
B 5655	1968.50 SWC Clst brn blk	8.2	24.1	32.3	34.2	67.7	47.8
B 5576	2085 Clst (med) dk gy-brn gy	18.1	21.6	39.7	83.6	60.3	65.9
B 5580	2145 Clst med dk gy-dk gy	33.6	28.8	62.4	116.7	37.6	166.0

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TABLE 8

TABULATION OF DATA FROM THE GASCHROMATOGRAMS

IKU No.	DEPTH (m)	PRISTANE / n-C17	PRISTANE / PHYTANE	CPI-1	CPI-2
B 5557	1800	1.8	3.2	1.3	1.4
	Clst dk brn gy-brn blk				
B 5559	1830	2.0	2.0	1.2	1.2
	Clst brn blk				
B 5651	1843	2.0	1.5	1.0	1.2
	SWC Clst dk brn gy-brn blk				
B 5652	1847	1.8	1.4	1.2	1.2
	SWC Clst dk brn gy-brn blk				
B 5562	1875	1.7	2.2	1.3	1.3
	Clst med dk gy-gy blk				
B 5564	1905	1.4	2.1	1.1	1.1
	Clst gy blk				
B 5566	1935	1.3	2.1	1.2	1.2
	Clst gy blk				
B 5655	1968.50	0.4	1.9	0.9	1.0
	SWC Clst brn blk				
B 5576	2085	0.6	2.3	1.1	1.1
	Clst (med)dk gy-brn gy				
B 5580	2145	0.8	2.7	1.1	1.1
	Clst med dk gy-dk gy				

DATE : 8 - 11 - 84.

Table 9: Aromatic hydrocarbon ratios

IKU No.	Depth (m)	MNR	DMNR	MPI I	MPI II
B-5557	1800	-	2.5	0.73	0.62
Clst.,dk brn gy-brn blk					
B-5559	1830	1.1	~2.6?	0.83	0.58
Clst., brn blk					
B-5651	1843	-	-	0.79	0.59
swc; Clst., dk brn gy-brn blk					
B-5652	1847	-	3.0	0.71	0.61
swc; Clst., dk brn gy-brn blk					
B-5562	1875	1.2	2.8	0.72	0.59
Clst., med dk gy-gy blk					
B-5564	1905	1.2	3.2	0.75	0.69
Clst., gy blk					
B-5566	1935	1.0	2.3	0.80	0.64
Clst., gy blk					
B-5655	1968.50	-	2.3	0.77	0.79
swc; Clst., brn blk					
B-5576	2085	1.4	3.5	0.77	0.80
Clst., (med) dk gy-brn gy					
B-5580	2145	1.0	2.3	0.77	0.76
Clst., med dk gy-dk gy					

MNR = Methyl Naphthalene Ratio 2/1 MN
DMNR = Dimethyl Naphthalene Ratio 2.6+2.7/1.5 DMN
MPI I = Methyl Phenanthrene Index I 1.5x(3+2MP)/P+9MP+1MP
MPI II = Methyl Phenanthrene Index II 3x(2MP)/P+9MP+1MP

Table 10

Molecular ratios calculated from terpane
and sterane mass chromatograms.
Source characteristic and maturity ratios.

IKU No.	DEPTH (m)	Q/E 1)	Tm/Ts 2)	X/E 3)	a/a+j 4)	Z/E 5)
B5559	1830	0.04	4.00	0.03	0.71	0.00
B5651	1843	0.09	7.57	0.05	0.78	0.00
B5566	1935	0.02	12.60	0.03	0.65	0.00
B5655	1968.50	0.02	2.46	0.06	0.64	0.00
B5576	2085	0.05	2.37	0.06	0.66	0.00

1) Relative abundance of tricyclic terpanes(Q/E in m/z 191).
2) B/A in m/z 191.
3) Relative abundance of unknown(X/E in m/z 191).
4) Relative abundance of C27 rearranged steranes(a/a+j).
5) Relative abundance of bisnorhopane(Z/E in m/z 191).

Table 11

Molecular ratios calculated from terpane
and sterane mass chromatograms.
Maturity ratios.

IKU No.	DEPTH (m)	1) αβ/αβ+βα	2) %22S	3) %ββ	4) %20S
B5559	1830	0.88	61.9	66.0	46.4
B5651	1843	0.93	59.4	76.0	50.0
B5566	1935	0.77	59.2	56.7	47.2
B5655	1968.50	0.88	58.0	63.5	50.4
B5576	2085	0.84	60.0	69.5	50.0

1) E/E+F in m/z 191.
2) % distribution between first and second elution isomers of doublet J (m/z 191)
3) 2(r+s)/(q+t+2(r+s)) in m/z 217.
4) q/q+t in m/z 217.

Table 12: Maturity ratios from aromatic steranes

Sample	Depth (m)	m/z 253 $\%C_{21}/C_{21}+C_{28,29}$	m/z 231 $\%C_{20}/C_{20}+C_{26,27}$	%TRI/TRI+MONO
B-5559	1830	26.1	19.2	69.7
B-5651	1843	39.0	17.3	69.5
B-5566	1935	-	25.9	31.8
B-5655	1968.5	-	55.2	63.1
B-5576	2085	-	70.0	62.0

Table 13. δ^{13} isotope data

IKU No.	Depth (m)	SAT.	ARO.
B-5559 Clst., brn blk	1830	-30.6	-29.2
B-5651 Swc; Clst., dk brn gy-brn blk	1843	-29.9	-28.1
B-5566 Clst., gy blk	1935	-30.2	-28.0
B-5655 Swc; Clst., brn, blk	1968.50	-	-27.4
B-5576 Clst., (med) dk gy-brn gy	2085	-29.9	-30.3

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TABULATION OF MATURITY DATA

IKU No.	DEPTH (m/ft)	VITRINITE REFLECTANCE Ro(%) and Counts	MATURATION INDEX (TAI)	FLUOR-ESCENCE
B 5607	850	1.17(2)	+1	4
		SWC -		
B 5609	909	N.D.P.	N.D.P.	4
		SWC -		
B 5611	950.90	1.43(3)	N.D.P.	3/4
		SWC -		
B 5613	1004	0.28(1)	N.D.P.	3
		SWC -		
B 5615	1050	1.19(1)	1+/2 2+/2	3/4
		SWC -	2	
B 5617	1128	0.46(3) 0.76(8)	N.D.P.	3/4
		SWC -		
B 5619	1171	0.60(1)	2-/2 2	4/5
		SWC -	2/2+	
B 5621	1225	1.00(1)	2-/2 2	4/5
		SWC -	2/2+	
B 5623	1275	0.66(8)	2-/2 2	5/6
		SWC -	2/2+	
B 5625	1327	0.66(4)	2-/2 2	5/6
		SWC -	2/2+	
B 5628	1435	0.62(1)	2-/2	4/5
		SWC -		
B 5630	1480	N.D.P.	2- 2-/2+	5/6
		SWC -	2+	
B 5632	1540	0.56(2)	2- 2-/2+	5/6
		SWC -	2+	
B 5633	1576	1.05(1)	2 2/2+	
		SWC -	2+	
B 5635	1642	0.71(11)	2	6
		SWC -		
B 5637	1680	0.66(10)	2-/2 2	6/7
		SWC -		
B 5641	1725	0.64(7)	2-/2 2	6/7
		SWC -		
B 5653	1847	0.57(8)	2-/2 2	6
		SWC -		
B 5657	2025.50	0.50(6) 0.74(9)	2	6/7
		SWC -		
B 5661	2135	1.33(3)	2-/2 2	6
		SWC -		

DATE : 7 - 11 - 84.

MICROSCOPIC ANALYSIS - REFLECTED LIGHT (NORMAL + U.V)

Table no.: 15
Well no.: 7121/7-1

IKU No.	Depth m/ft	Dominant lithology	Ro value (%)	Population size	Dominant maceral type	Liptinites UV Fluorescence	Liptinites Content	Additive	Bitumen	Cave
B-5607	850	Marl	1.17*	2	Inertinite+ reworked Vit.	4	Very Poor			
B-5609	909	Carbonate	NDP	-	Inertinite	4	Trace			
B-5611	950.5	Carbonate	1.43*	3	Inertinite	3-4	Trace			
B-5613	1004	Claystone	0.28**	1	Inertinite+ Liptinite	3	Poor-Fair			
B-5615	1050	Claystone	1.19*	1	Reworked Vit.+ Inertinite	3-4	Trace-Poor			
B-5617	1128	Claystone	0.46,0.76	3,8	Reworked Vit.	3-4	Fair			
B-5619	1171	Claystone	0.60	1	Inertinite	4-5	Trace			
B-5621	1225	Claystone	1.00*	1	Inertinite+ Liptinite	3	Trace			
B-5623	1275	Claystone	0.66	8	Inertinite	5-6	Poor-Fair			
B-5625	1327	Claystone	0.66	4	Inertinite	5-6	Trace			
B-5628	1435	Claystone	0.62	1	Inertinite	4-5	Poor-Fair			
B-5630	1480	Claystone	NDP	-	Inertinite	5-6	Trace			
B-5632	1540	Claystone	0.56	2	Inertinite+ Reworked Vit.	5-6	Trace			
B-5633	1576	Claystone	1.05*	1	Inertinite	Absent	Absent			
B-5635	1642	Claystone	0.71	11	Reworked Vit.+ Vitrinite	6	Fair			
B-5637	1680	Claystone	0.66	10	Reworked Vit.	6-7	Trace			
B-5641	1725	Claystone	0.64	7	Liptinite stringers	6,7	Trace-Poor			
B-5653	1847	Claystone	0.57	8	Liptinite	6	Fair-Good			
B-5657	2025.5	Siltstone	0.50,0.74	6,9	Liptinite+ Vitrinite	6-7	Fair			
B-5661	2135	Carbonate	1.33*	3	Inertinite	6	Poor			

* - Reworked material
NDP - No Determination Possible
** - stained?
133/å/ibl/1

IKU

Visual Kerogen Analysis

TABLE NO.: 16
WELL NO.: 7121/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
B-5607	850	WR!,W,P/Am,Algal,Cy	F-M	Good	1+	Angular reworked/oxidised woody particles and structured woody material. Pollen include bisaccates and porates.
B-5609	909	Cy,Am/WR!,W	F	Good	NDP	Spiny brown cysts dominate completely. Cretaceous material. Some grey amorphous.
B-5611	950.5	*WR!,W/Cy,Am	F-M	Good	NDP	*Small residue. Black angular fragments, mostly minerals. Some structured wood. A varied cyst assemblage.
B-5613	1004	Am,Cy/RW!,W	F-M	Good	NDP	Grey amorphous aggregates and a good cyst assemblage dominated by a few forms. Structured woody fragments and degraded material.

ABBREVATIONS

Am	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
He	Herbaceous	P	Pollen grains	C	Coal	M	Medium
Cut	Cuticles	S	Spores	R!	Reworked	L	Large

133/ss/ibl/4

IKU

Visual Kerogen Analysis

TABLE NO.: 16
WELL NO.: 7121/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
B-5615	1050	WR!,W,P/Am,Cy	F-M	Variable	1+/2-,2-/2,2	Grey amorphous material and opaque angular woody fragments grading towards structured woody material. Pollen are rare and appear stained.
B-5617	1128m	Am,Cy/WR!,W	F-M	Good	NDP	Resemblance with 1004m (B-5613).
B-5619	1177	W,WR!/Am,Cy	F	Good to fair	2-/2, 2	Fine amorphous probably algal material. Abundant cysts. Structured woody material.
B-5621	1225	WR!,W/Am,Algal,Cy	F	Good to fair	2, 2/2+	Aggregates of combined organic/inorganic substance. Cysts and pollen appear partly stained and partly have a dull greyish colour.
B-5623	1275	WR!,W,P,S/Am,Cy	F-M	Good to fair	2, 2-/2	Structured dark woody material. Rich in Cretaceous spores and pollen. Some grey amorphous.

ABBREVATIONS

Am	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
He	Herbaceous	P	Pollen grains	C	Coal	M	Medium
Cut	Cuticles	S	Spores	R!	Reworked	L	Large

IKU

Visual Kerogen Analysis

TABLE NO.: 16
WELL NO.: 7121/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
B-5625	1327	*W,WR!,P,S/Algal,Cy	F-M	Variable	2	Small residue. Palynomorphs partly bleached, partly stained or have a greyish colour quality.
B-5628	1435	WR!,W,S,P,Cut/Algal,Cy	F-M-L	Variable	2-/2	Abundant opaque minerals (pyrite and hematite). Dark reworked/oxidised woody material, vitrinite and degraded light coloured wood cells. Palynomorphs are thin etched. Some cuticles of variable coarseness. Matrix of strongly degraded/-"amorphous" material partly probably has algal sources.
B-5630	1480	WR!,W,P,S,Cut/Algal,Cy	F-M	Variable	2	Aggregates of organic and inorganic material. Grey amorphous. Etched, greyish woody material and structured well preserved. Etched often thinwalled palynomorphs.

ABBREVATIONS

Am	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
He	Herbaceous	P	Pollen grains	C	Coal	M	Medium
Cut	Cuticles	S	Spores	R!	Reworked	L	Large

133/ss/ibl/6

IKU

Visual Kerogen Analysis

TABLE NO.: 16
WELL NO.: 7121/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
B-5632	1540	WR!,W,S,P,Cut/Algal,Cy	F-M-L	Variable	2-, 2-/2, 2	Grey amorphous aggregates. Structured woody material. Very thin walled palynomorphs.
B-5633	1576	Algal,Cy/W,WR!,P	F-M-L	Fair to poor	2, 2/2+, 2+	Structured woody material in a fine amorphous matrix of supposed algal affinity. Thin walled cysts of dull brownish colour. Pollen seem stained.
B-5635	1642	W,WR!,Cut,P,S/Algal,Cy	F-M-L	Variable	2	Poorly sorted material. Structures retained but degraded.
B-5637	1680	W,WR!,Cut,P/Algal,Cy	F-M-L	Variable	2-/2, 2	Mostly poorly preserved and strongly degraded. Structured woody material.
B-5641	1725	W,Cut,P,S/Am	F-M-L	Poor to fair	2	Strongly degraded material as aggregates. Abundant pyrite. Chemical oxidation required for a closer identification.

ABBREVATIONS

Am	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
He	Herbaceous	P	Pollen grains	C	Coal	M	Medium
Cut	Cuticles	S	Spores	R!	Reworked	L	Large

133/ss/ibl/7

IKU Visual Kerogen Analysis

TABLE NO.: 16
WELL NO.: 7121/7-1

Sample	Depth (m)	Composition of residue	Particle size	Preservation palynomorphs	Thermal maturation index	Remarks
B-5653	1847	W,Cut,P/Am	F-M-L	Poor to fair	2-/2, 2	Aggregates of strongly degraded material evaluated as of terrestrial origin. Chemical oxidation needed for a closer classification.
B-5657	2025.5	Cut,W,P,S/Am	F-M-L	Poor to fair	2	Mechanically fragmented coarse cuticles.
B-5661	2135	W,WR!,Cut,S,P/Am	F-M-L	Good to fair	2-/2, 2	Coaly/woody fragments. Elongated structured woody fragments. Variable cuticles.

ABBREVATIONS

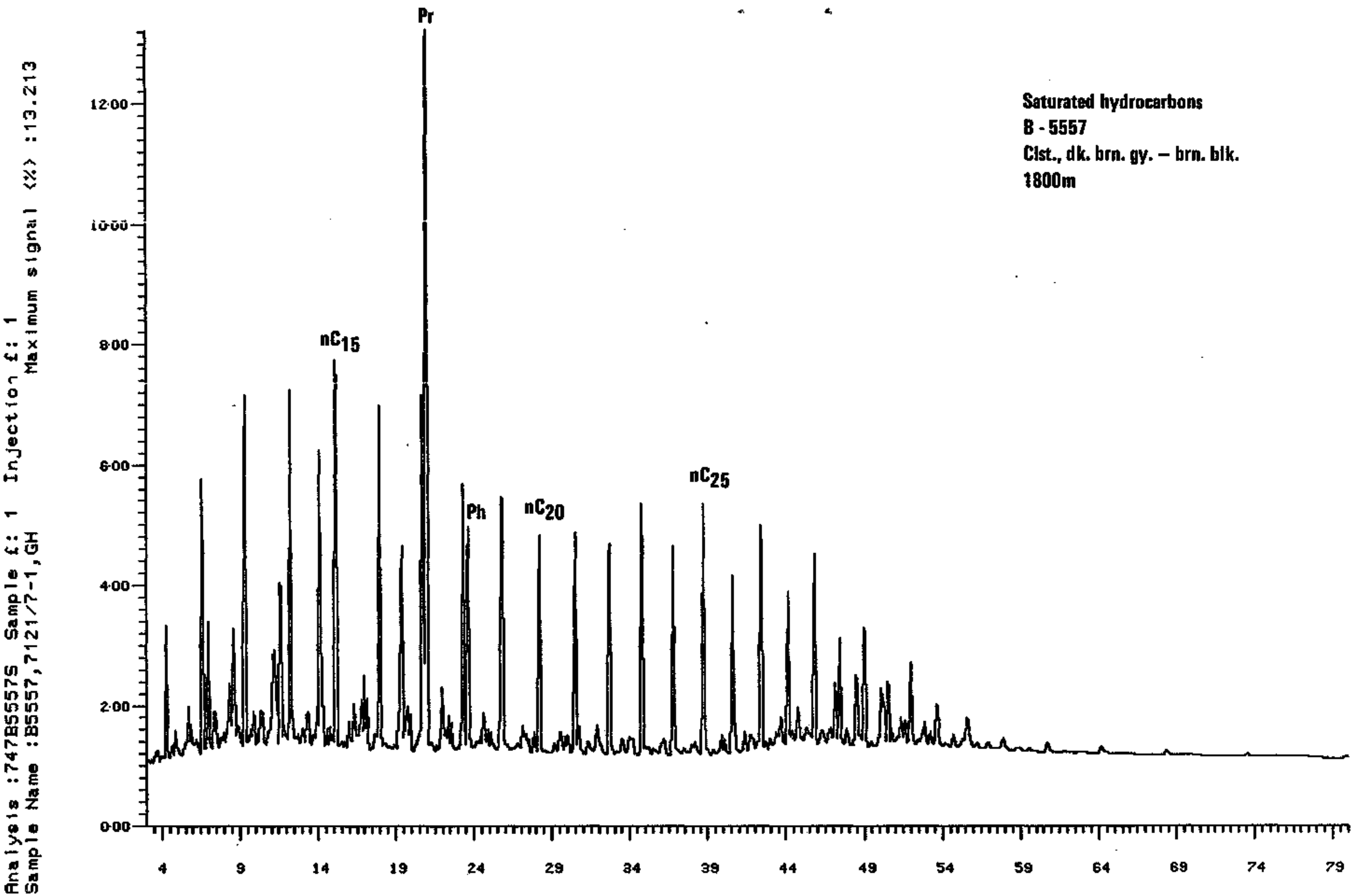
Am	Amorphous	Cy	Cysts, algae	W	Woody material	F	Fine
He	Herbaceous	P	Pollen grains	C	Coal	M	Medium
Cut	Cuticles	S	Spores	R!	Reworked	L	Large

133/ss/ibl/8

FIGURE 1

Gas chromatograms of C_{15}+ saturated hydrocarbons

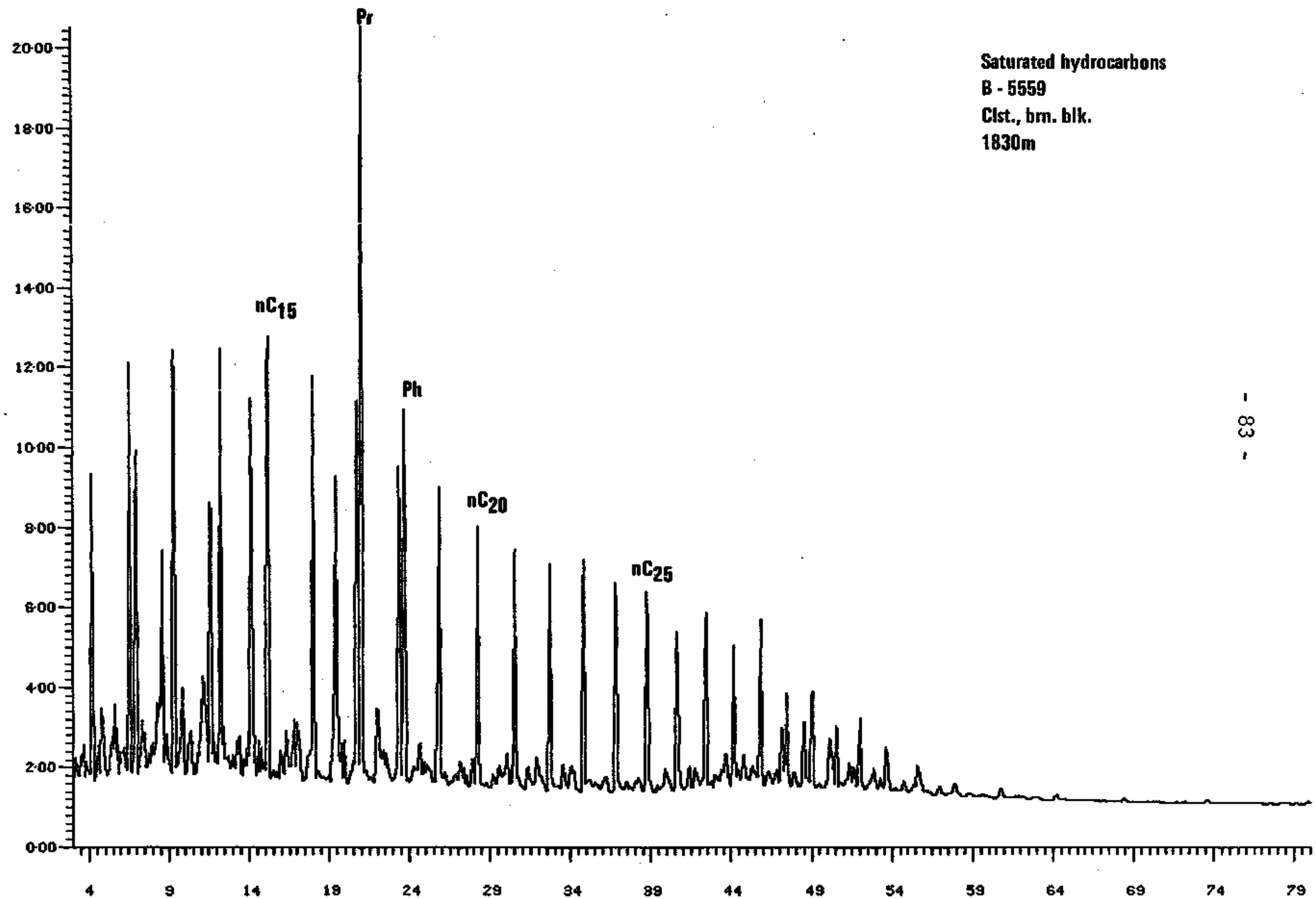
Pr - pristane
Ph - phytane

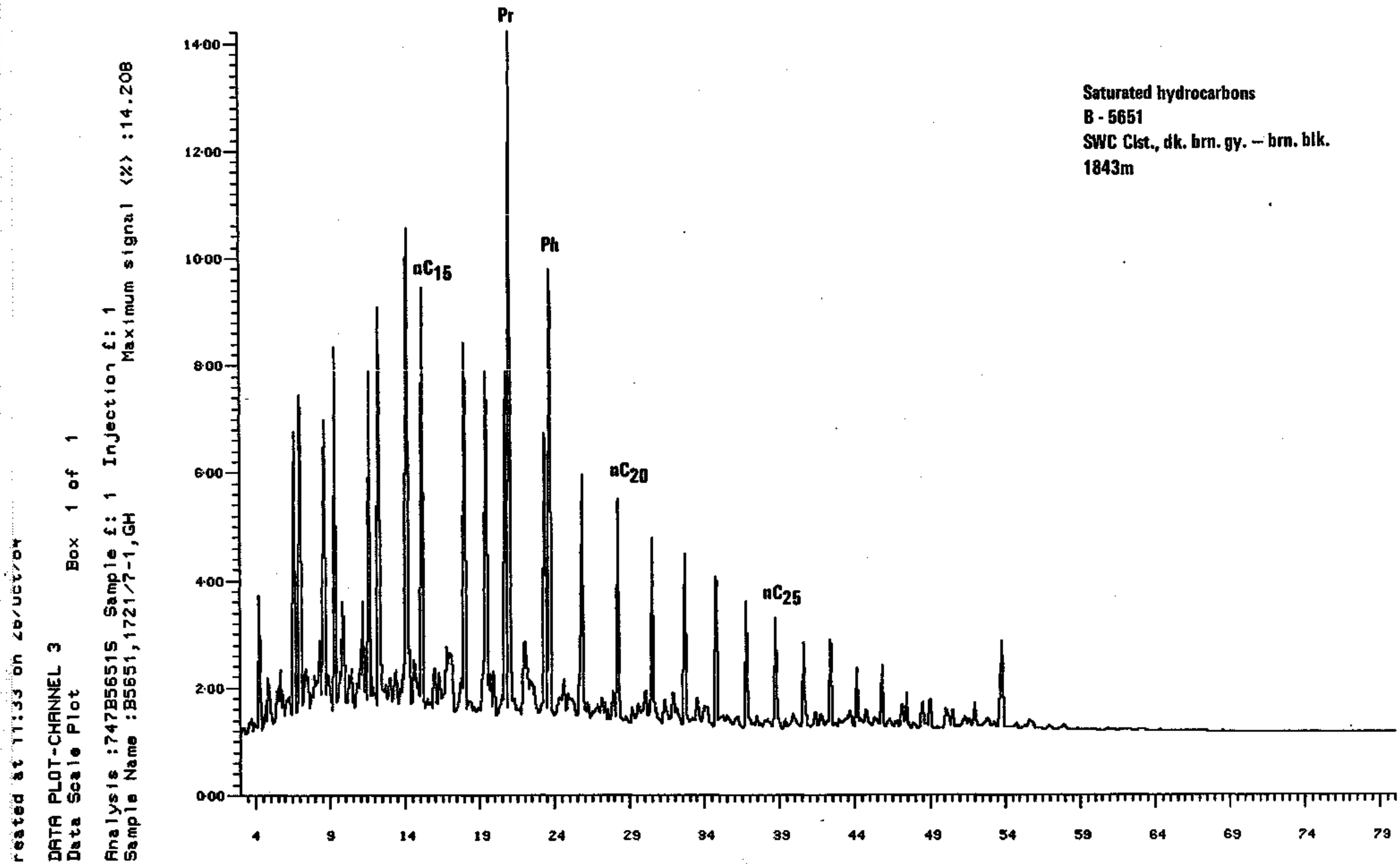

Analysis :747B5557S Sample £: 1 Injection £: 1
Sample Name :B5557,7121/7-1,GH Maximum signal (%) :13.213
Saturated hydrocarbons
B - 5557
Clst., dk. brn. gy. – brn. blk.
1800m
Pr
nC15
Ph
nC20
nC25
12·00
10·00
8·00
6·00
4·00
2·00
0·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74
79

reated at 15:14 on 29/Oct/84

DATA PLOT-CHANNEL 3 Box 1 of 1
Data Scale Plot

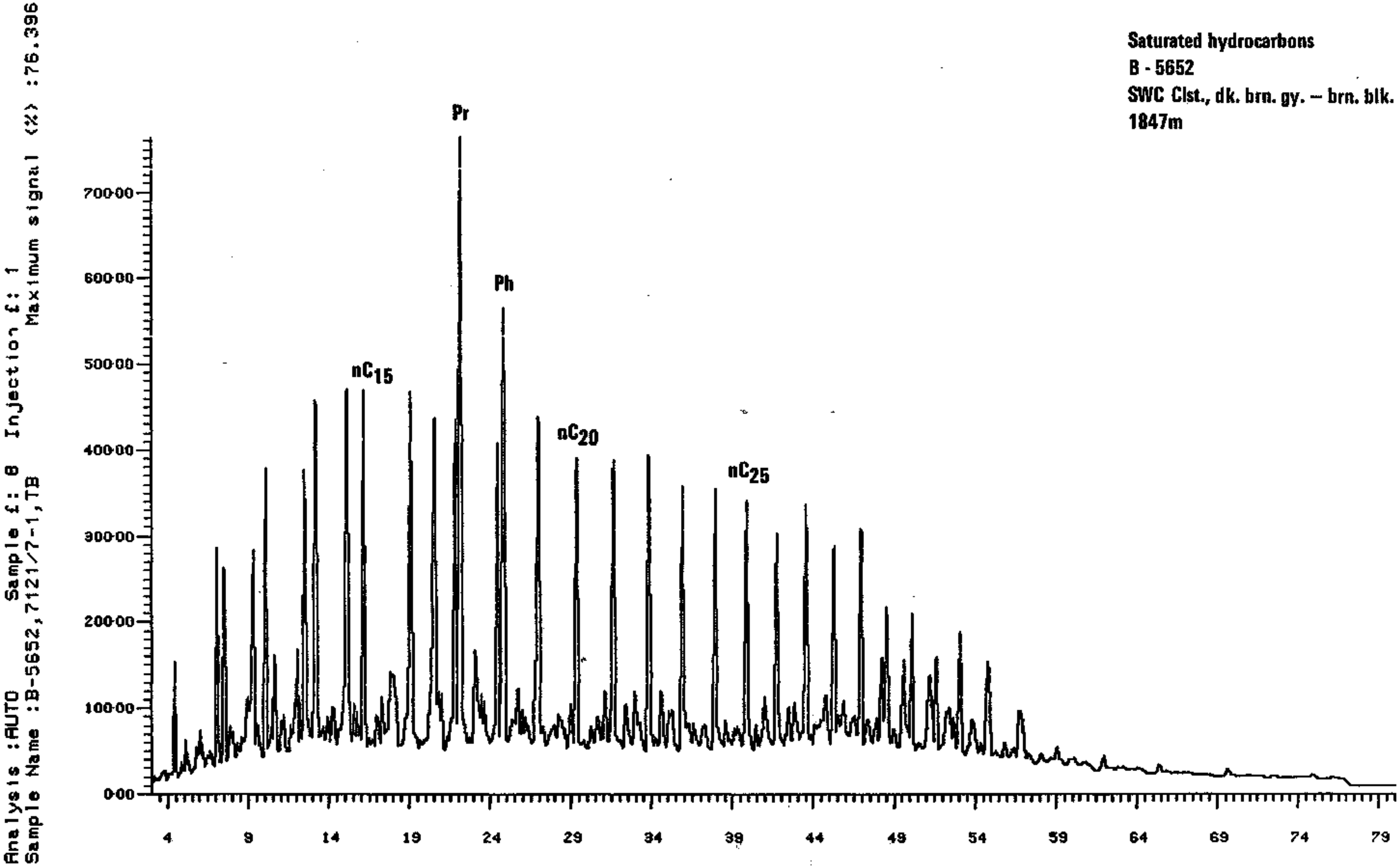
Analysis :747B5559S Sample £: 1 Injection £: 1
Sample Name :B5559,7121/7-1,GH Maximum signal (%) :20.518

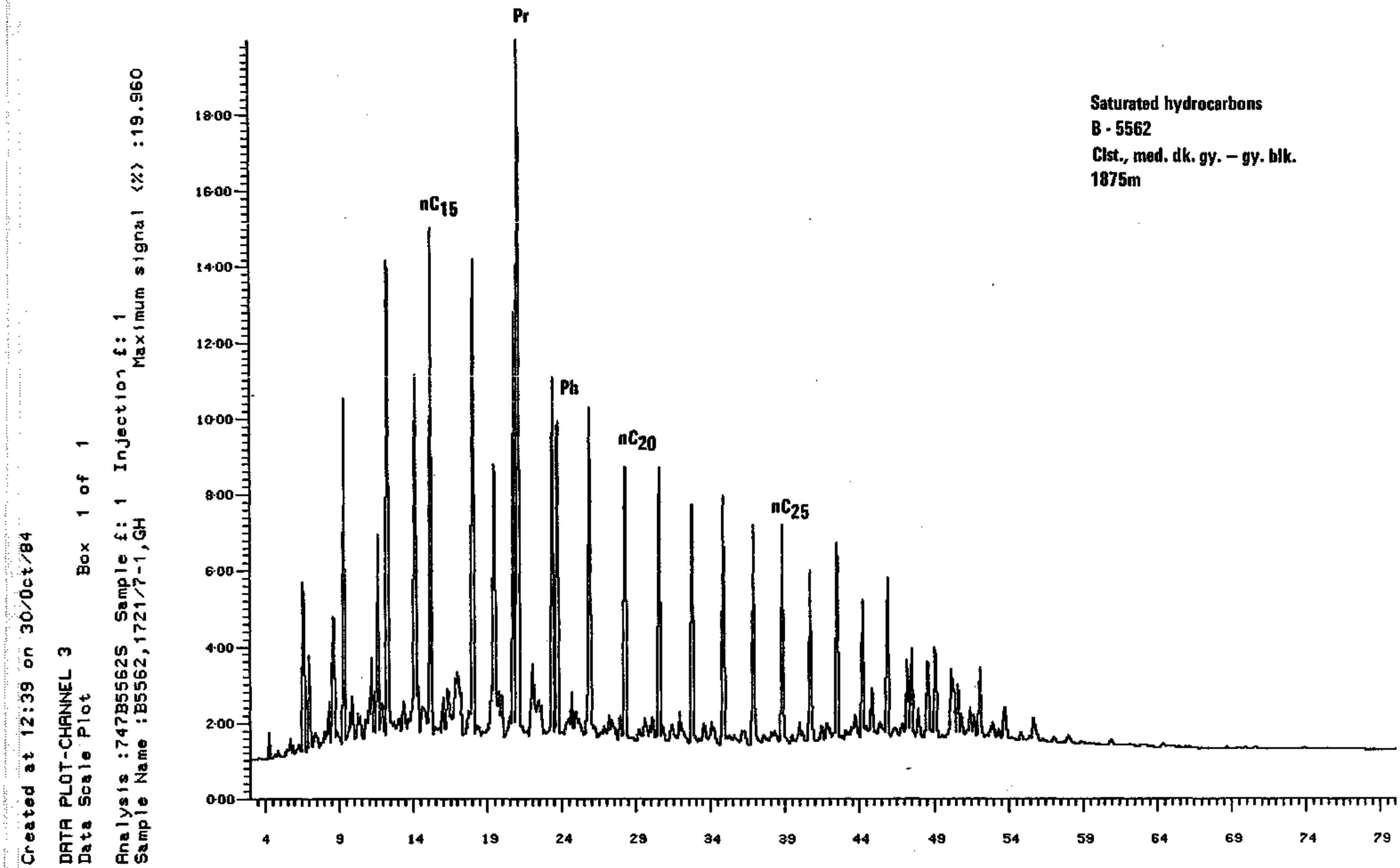




reated at 11:33 on 26/Oct/94
DATA PLOT-CHANNEL 3
Box 1 of 1
Data Scale Plot
Analysis :747B5651S Sample £: 1 Injection £: 1
Sample Name :B5651,1721/7-1,GH
Maximum signal (%) :14.208
Saturated hydrocarbons
B - 5651
SWC Clst., dk. brn. gy. – brn. blk.
1843m
Pr
Ph
nC15
nC20
nC25
14·00
12·00
10·00
8·00
6·00
4·00
2·00
0·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74
79

Saturated hydrocarbons
B - 5652
SWC Clst., dk. brn. gy. – brn. blk.
1847m




Created at 12:39 on 30/Oct/84
DATA PLOT-CHANNEL 3
Data Scale Plot
Box 1 of 1
Analysis :747B5562S Sample £: 1 Injection £: 1
Sample Name :B5562,1721/7-1,GH
Maximum signal (%) :19.960
Saturated hydrocarbons
B - 5562
Clst., med. dk. gy. – gy. blk.
1875m
Pr
nC15
Ph
nC20
nC25
18·00
16·00
14·00
12·00
10·00
8·00
6·00
4·00
2·00
0·00
4
9
14
19
24
29
34
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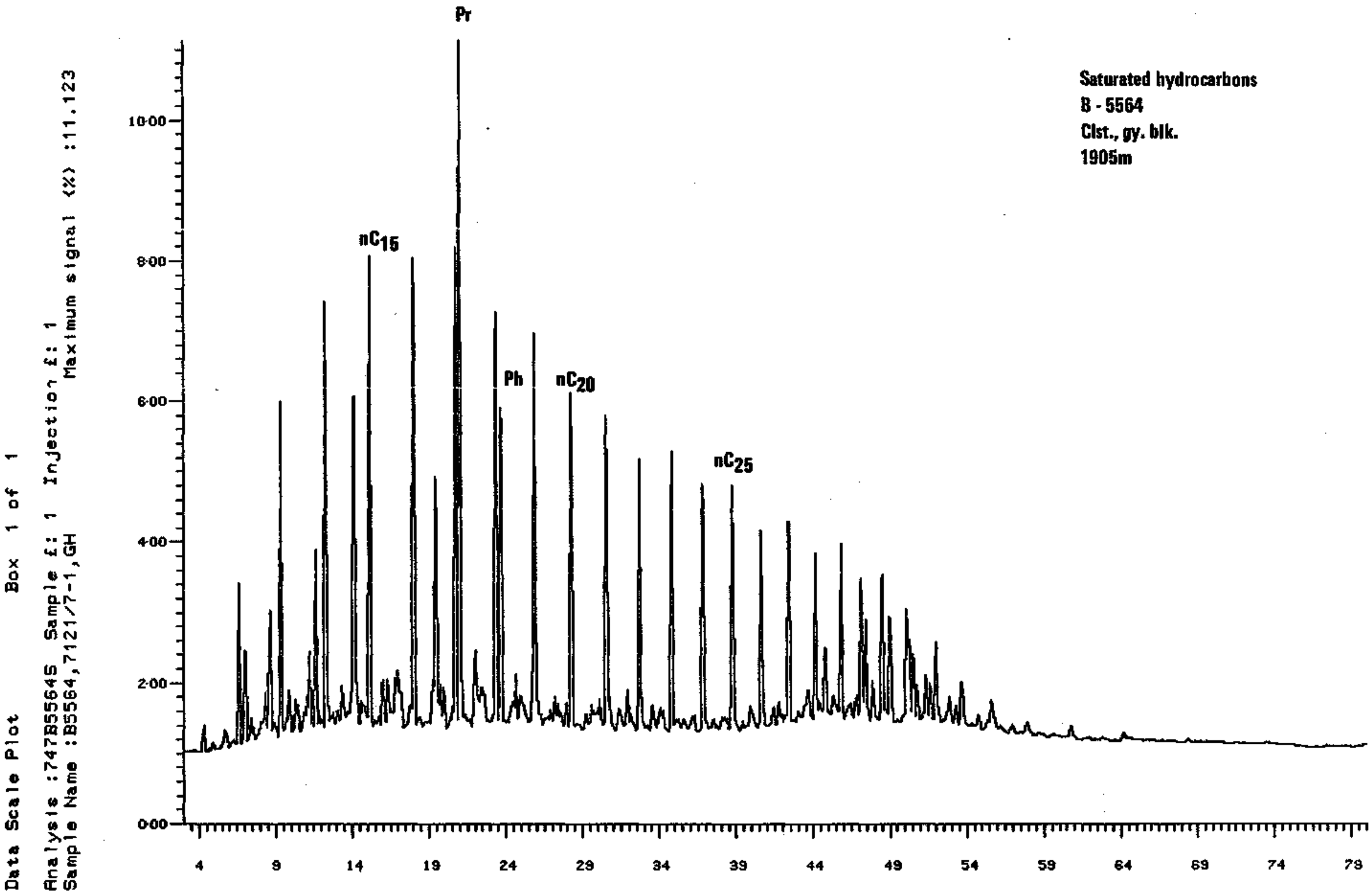
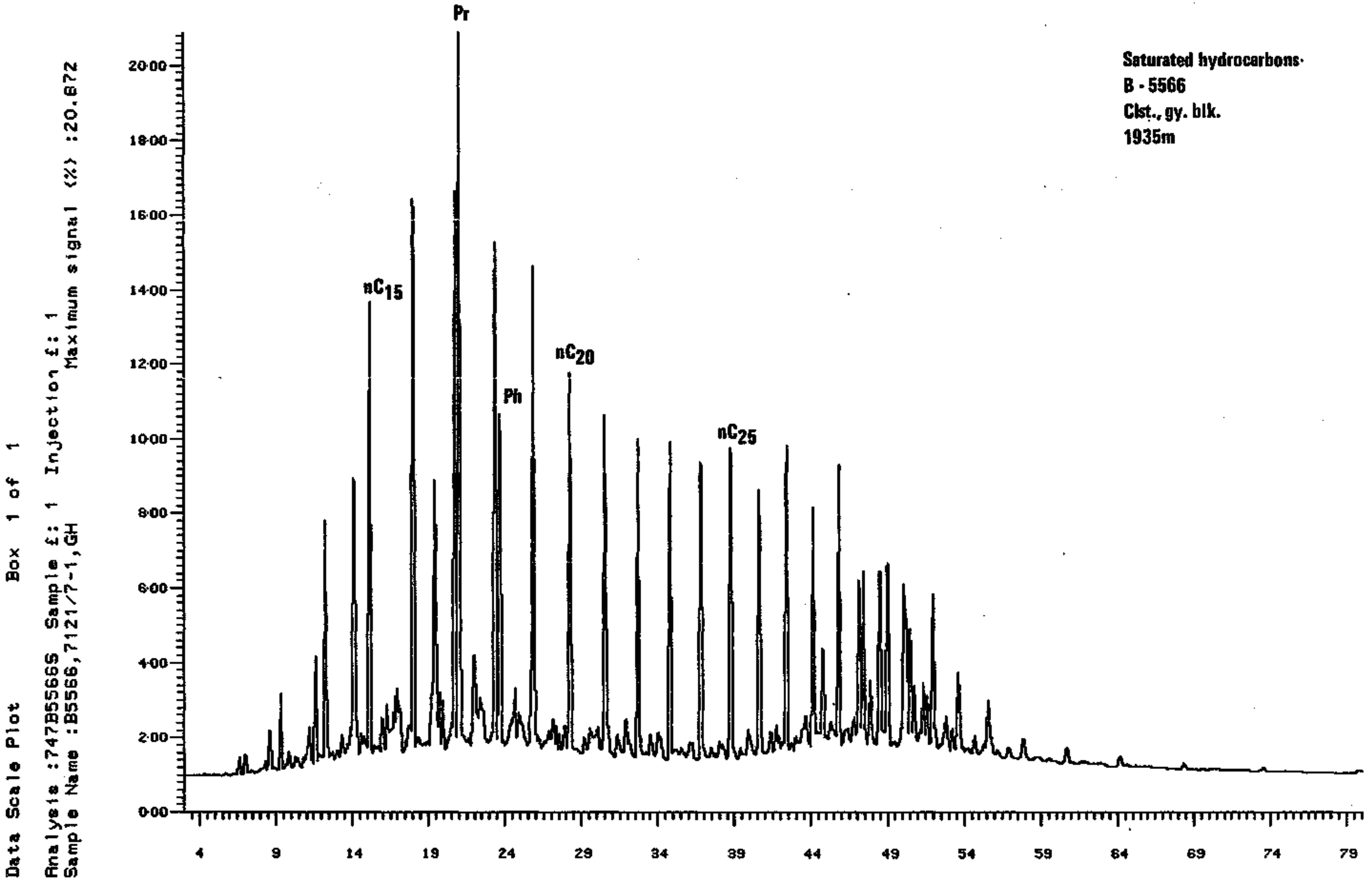
59
64
69
74
79

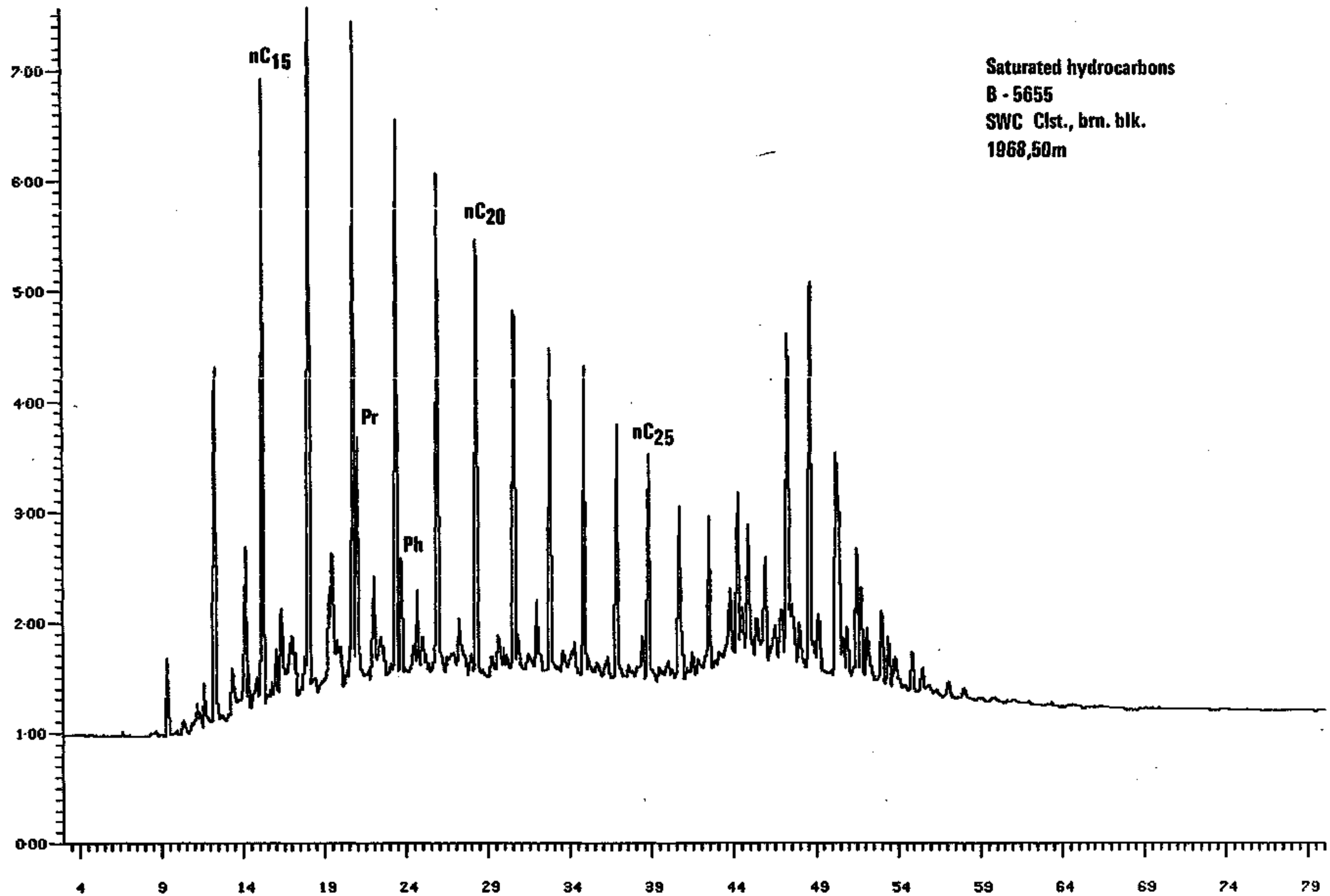

Data Scale Plot
Box 1 of 1
Analysis :747B5564S Sample £: 1 Injection £: 1
Sample Name :B5564,7121/7-1,GH
Maximum signal (%) :11.123
Saturated hydrocarbons
B - 5564
Clst., gy. blk.
1905m
Pr
nC15
Ph
nC20
nC25
0·00
2·00
4·00
6·00
8·00
10·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74
79

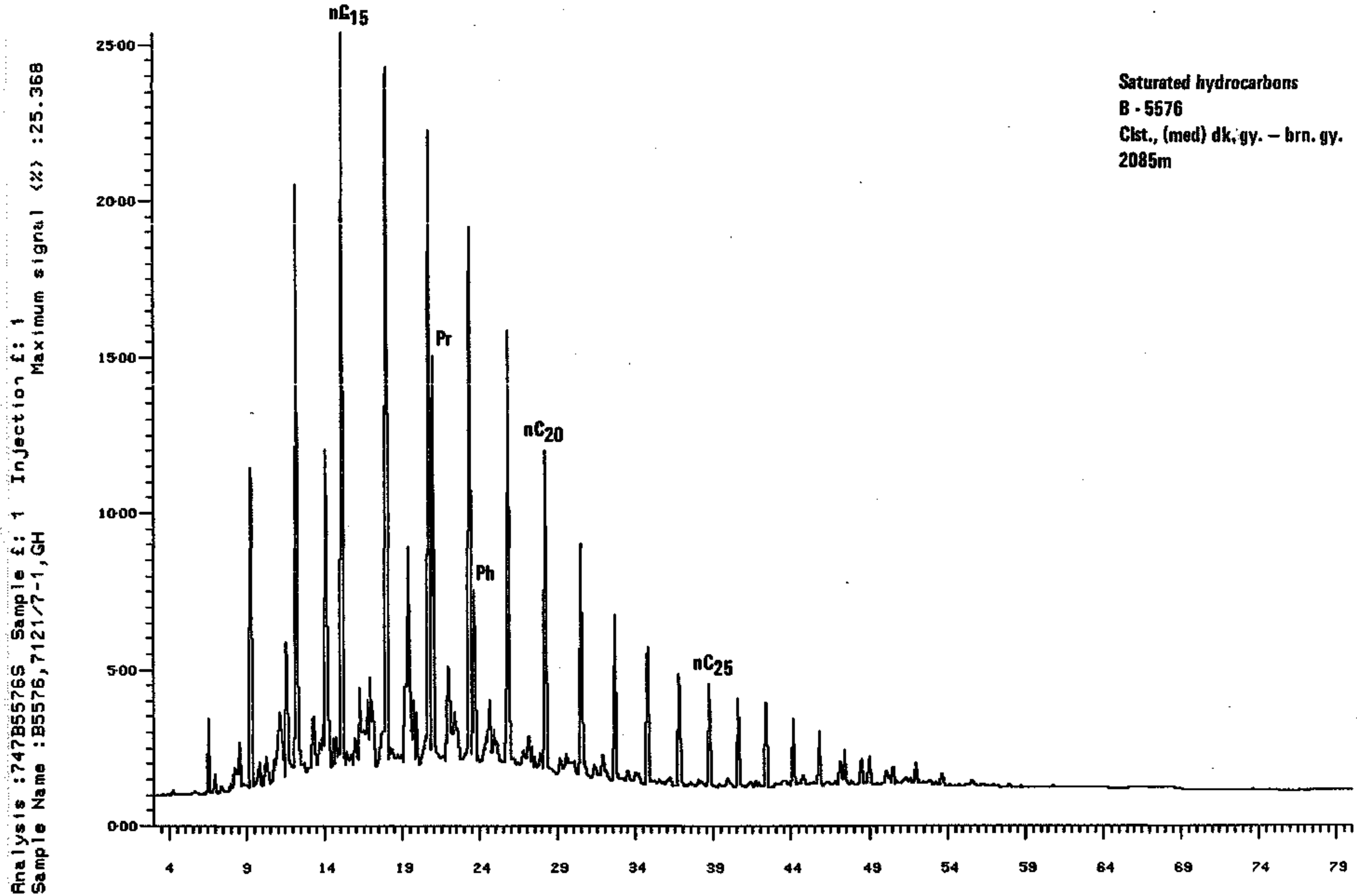

Data Scale Plot
Box 1 of 1
Analysis :747B5566S Sample £: 1 Injection £: 1
Sample Name :B5566,7121/7-1,GH
Maximum signal (%) :20.872
Saturated hydrocarbons
B - 5566
Clst., gy. blk.
1935m
Pr
Ph
nC_{15}
nC_{20}
nC_{25}
0·00
2·00
4·00
6·00
8·00
10·00
12·00
14·00
16·00
18·00
20·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74
79

Created at 15:20 on ...

DATA PLOT-CHANNEL 3 Box 1 of 1
Data Scale Plot

Analysis :747B5655S Sample £: 1 Injection £: 1
Sample Name :B5655,1721/7-1,GH Maximum signal (%) :7.566





Analysis :747B5576S Sample £: 1 Injection £: 1
Sample Name :B5576,7121/7-1,GH Maximum signal (%) :25.368
Saturated hydrocarbons
B - 5576
Clst., (med) dk, gy. – brn. gy.
2085m
nC15
Pr
Ph
nC20
nC25
25·00
20·00
15·00
10·00
5·00
0·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74
79

DATA PLOT-CHANNEL 3 Box 1 of 1
Data Scale Plot

Analysis :747B5580S Sample £: 1 Injection £: 1
Sample Name :B5580,1721/7-1,GH Maximum signal (%) :11.523

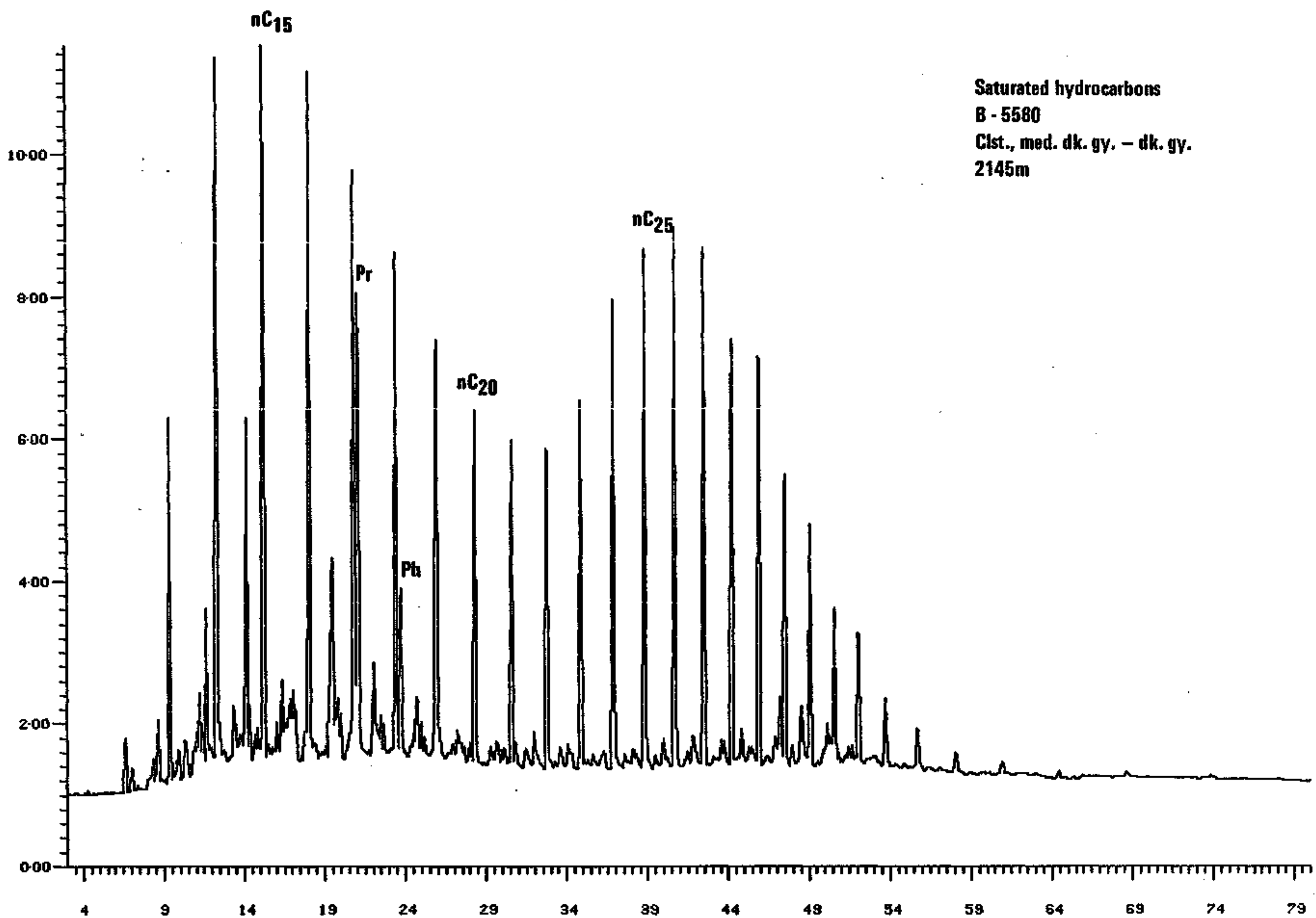


FIGURE 2

Gas chromatograms of C_{15}+ aromatic hydrocarbons

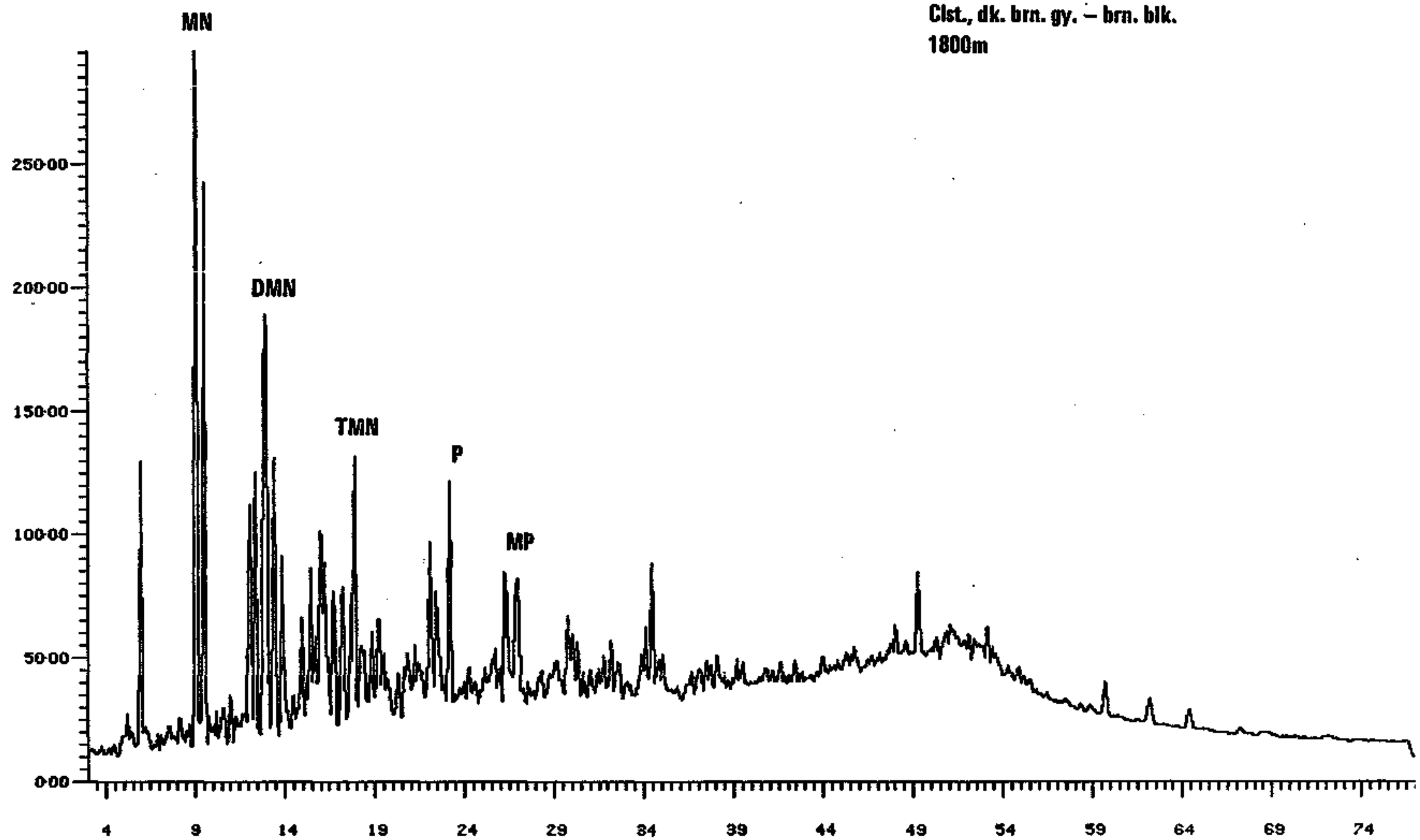
MN	-	methylnaphthalenes
DMN	-	dimethylnaphthalenes
TMN	-	trimethylnaphthalenes
P	-	phenanthrene
MP	-	methylphenanthrenes

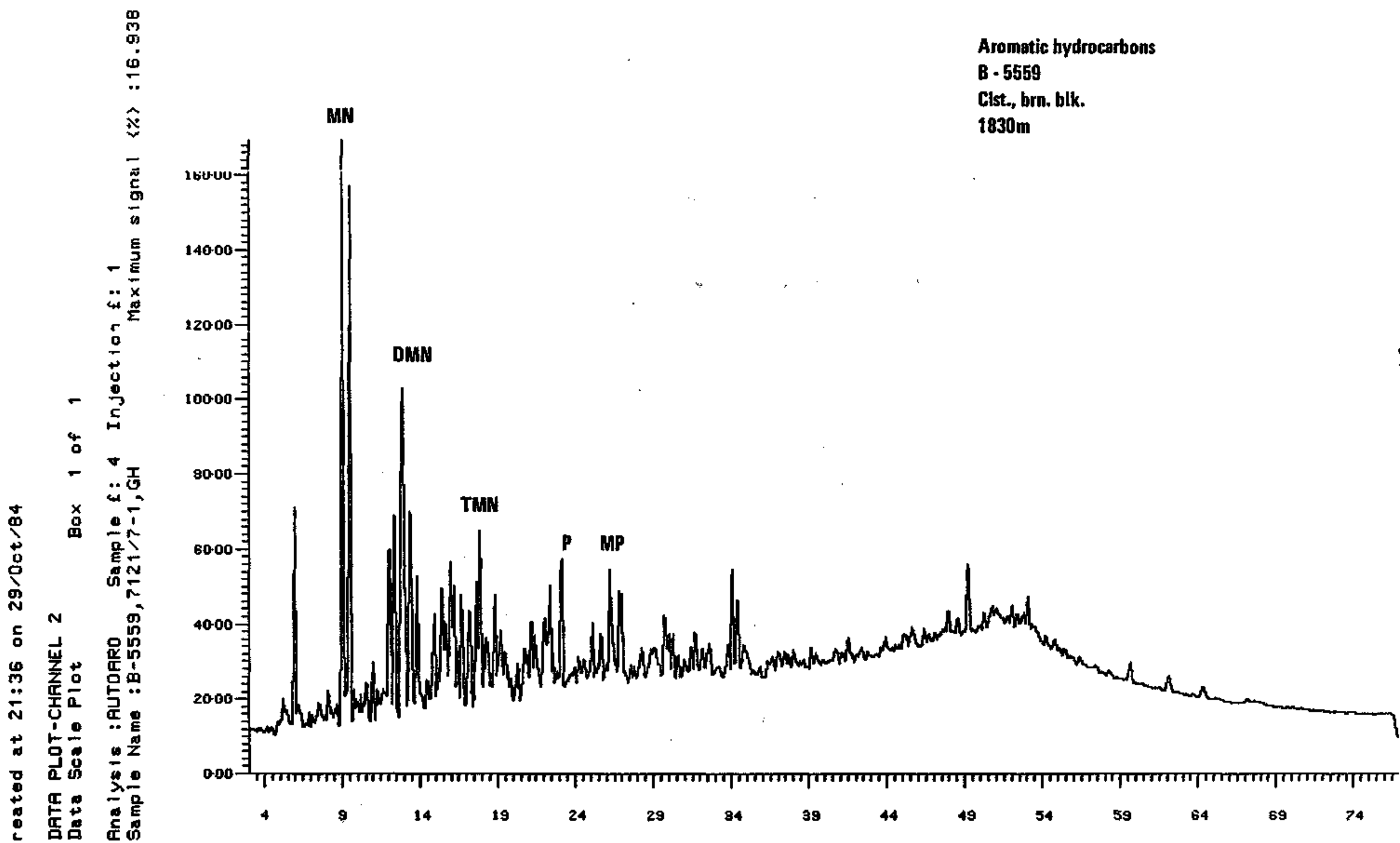
rested at 20:07 on 29/Oct/84

DATA PLOT-CHANNEL 2 Box 1 of 1
Data Scale Plot

Analysis :AUTOARO Sample £: 3 Injection £: 1
Sample Name :B-5557,7121/7-1,GH Maximum signal (%) :29.579

Aromatic hydrocarbons
B - 5557
Clst., dk. brn. gy. – brn. blk.
1800m





reated at 21:36 on 29/Oct/84
DATA PLOT-CHANNEL 2
Data Scale Plot
Box 1 of 1
Analysis :AUTOARD
Sample £: 4
Injection £: 1
Sample Name :B-5559,7121/7-1,GH
Maximum signal (%) :16.938
Aromatic hydrocarbons
B - 5559
Clst., brn. blk.
1830m
MN
DMN
TMN
P
MP
160·00
140·00
120·00
100·00
80·00
60·00
40·00
20·00
0·00
4
9
14
19
24
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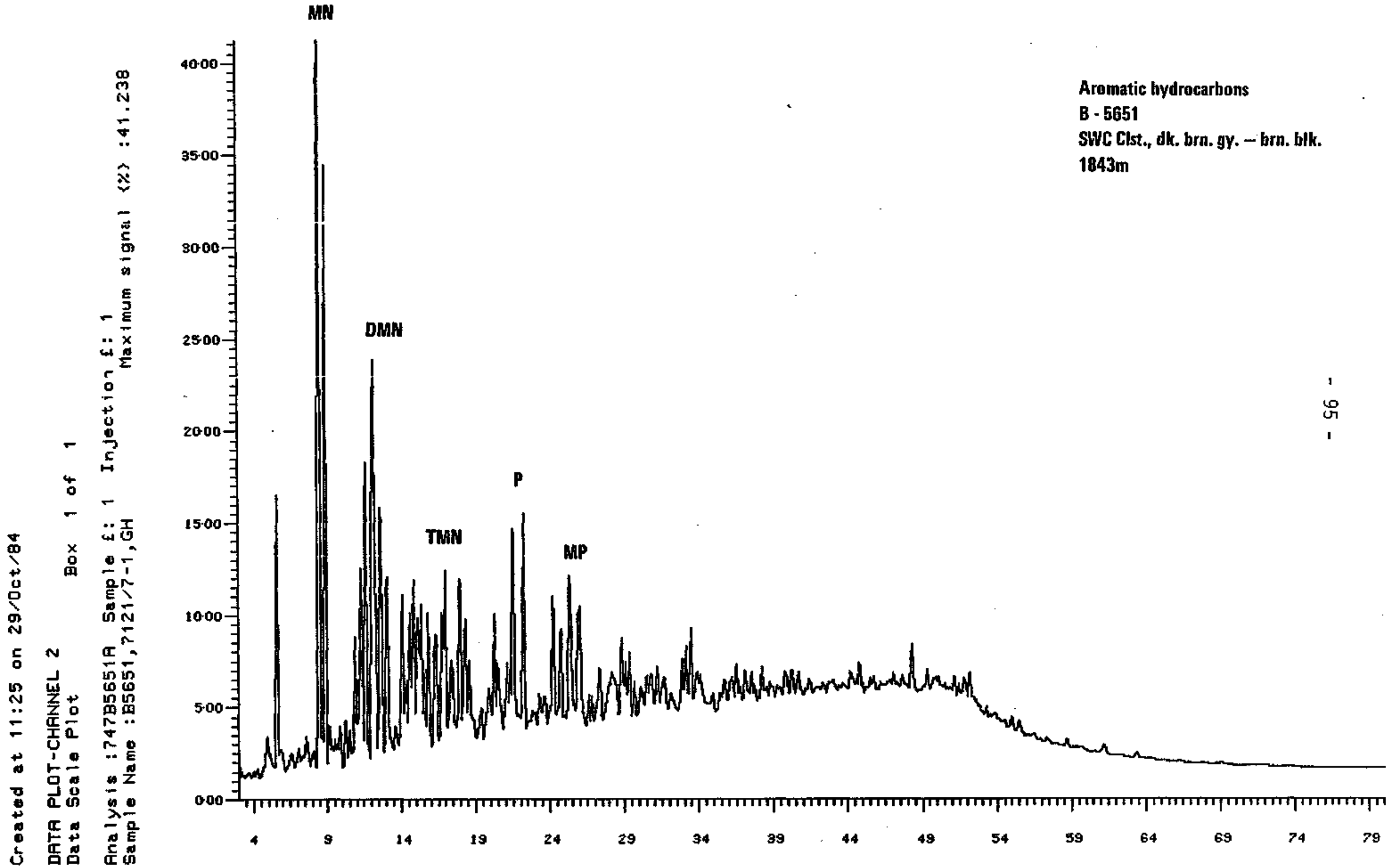
49
54
59
64
69
74



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DATA PLOT-CHANNEL 2 Box 1 of 1
Data Scale Plot
Analysis :747B5651A Sample £: 1 Injection £: 1
Sample Name :B5651,7121/7-1,GH Maximum signal (%) :41.238
MN
DMN
TMN
P
MP
Aromatic hydrocarbons
B - 5651
SWC Clst., dk. brn. gy. — brn. blk.
1843m
0·00
5·00
10·00
15·00
20·00
25·00
30·00
35·00
40·00
4
9
14
19
24
29
34
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44
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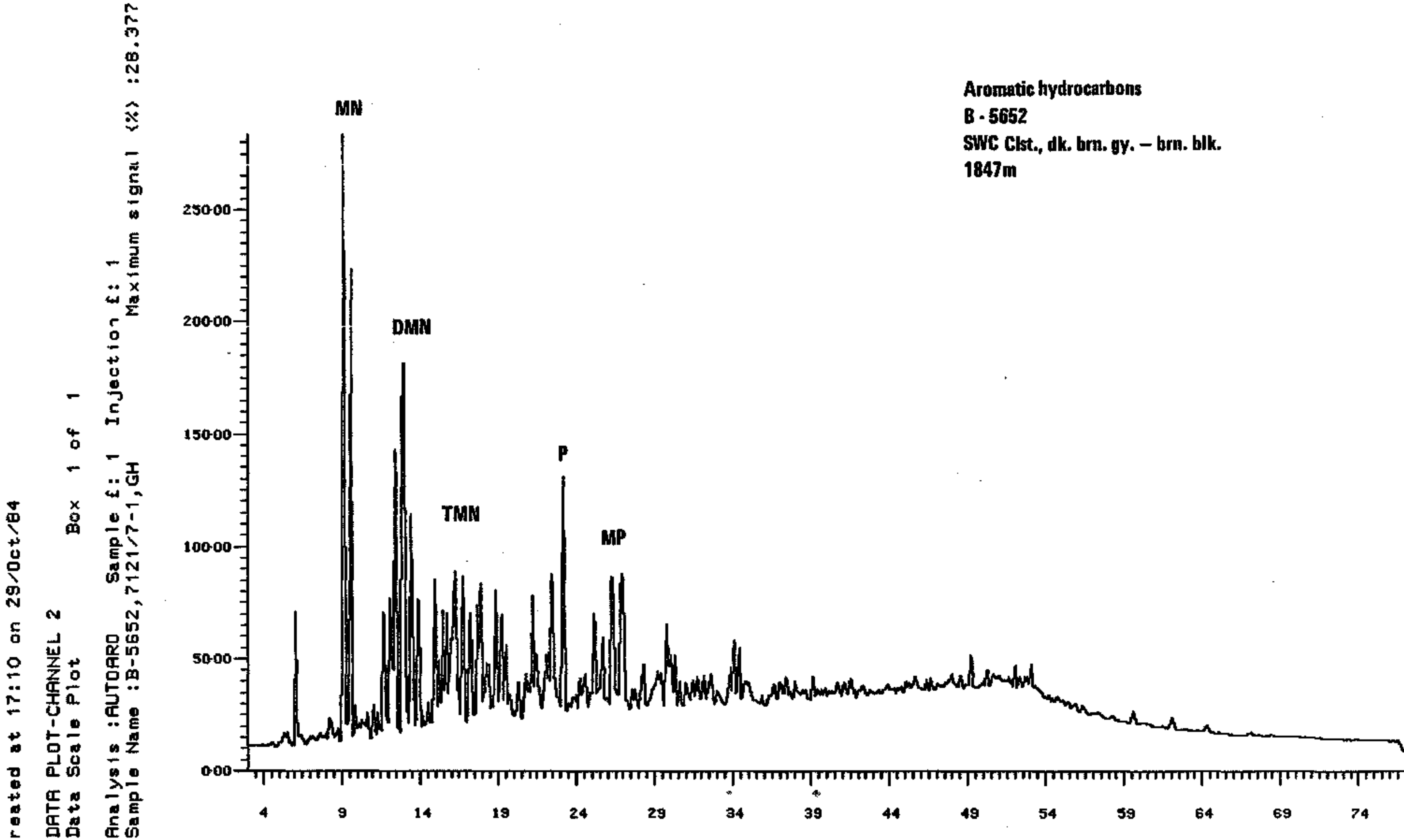
54
59
64
69
74
79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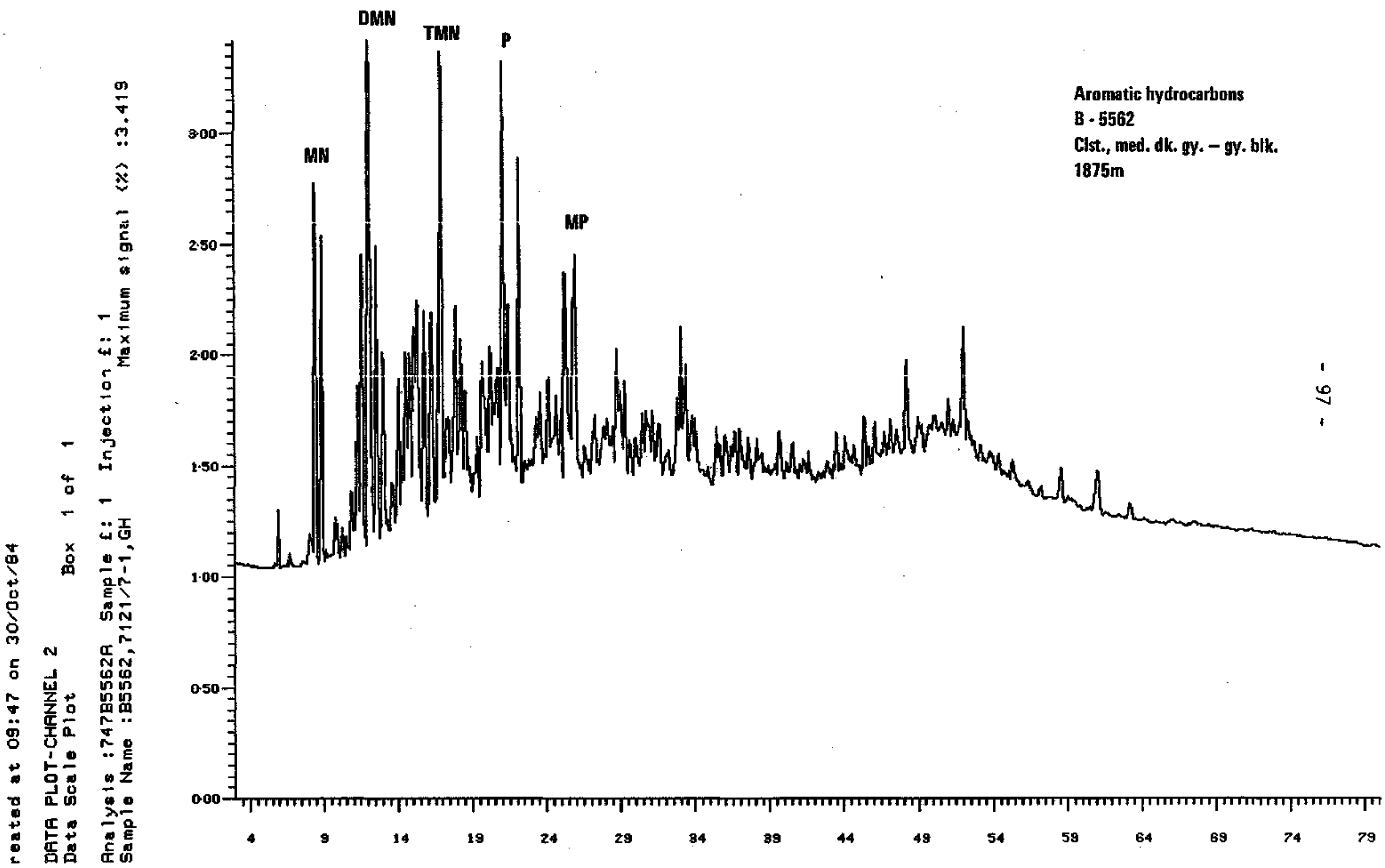
DATA PLOT-CHANNEL 2
Box 1 of 1
Data Scale Plot
Analysis :AUTOARD
Sample £: 1
Injection £: 1
Sample Name :B-5652,7121/7-1,GH
Maximum signal (%) :28.377
Aromatic hydrocarbons
B - 5652
SWC Clst., dk. brn. gy. – brn. blk.
1847m
MN
DMN
TMN
P
MP
250·00
200·00
150·00
100·00
50·00
0·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74


Aromatic hydrocarbons
B - 5562
Clst., med. dk. gy. – gy. blk.
1875m
MN
DMN
TMN
P
MP
reated at 09:47 on 30/Oct/84
DATA PLOT-CHANNEL 2 Box 1 of 1
Data Scale Plot
Analysis :747B5562A Sample £: 1 Injection £: 1
Sample Name :B5562,7121/7-1,GH Maximum signal (%) :3.419
0·00
0·50
1·00
1·50
2·00
2·50
3·00
4
9
14
19
24
29
34
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44
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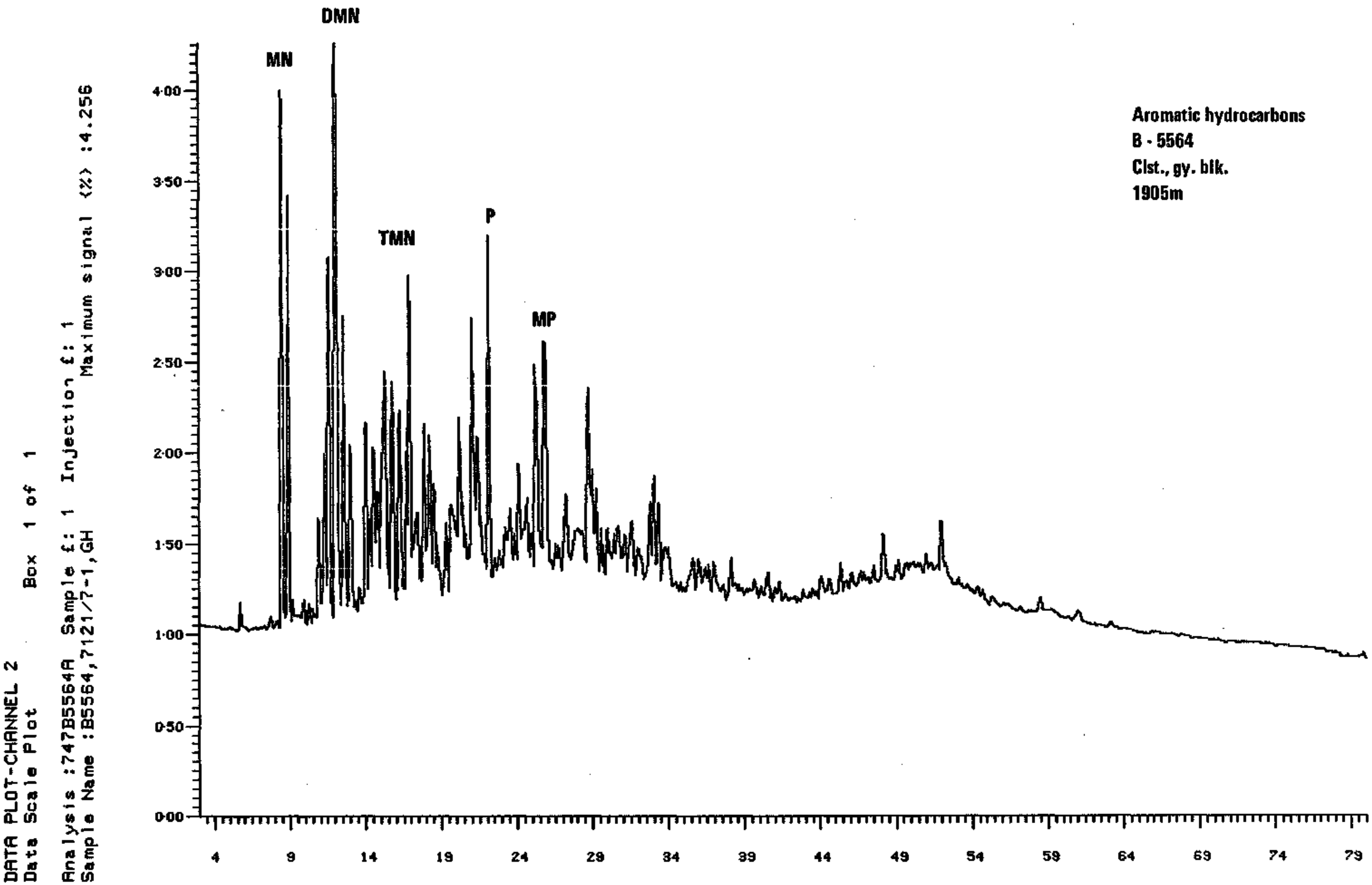
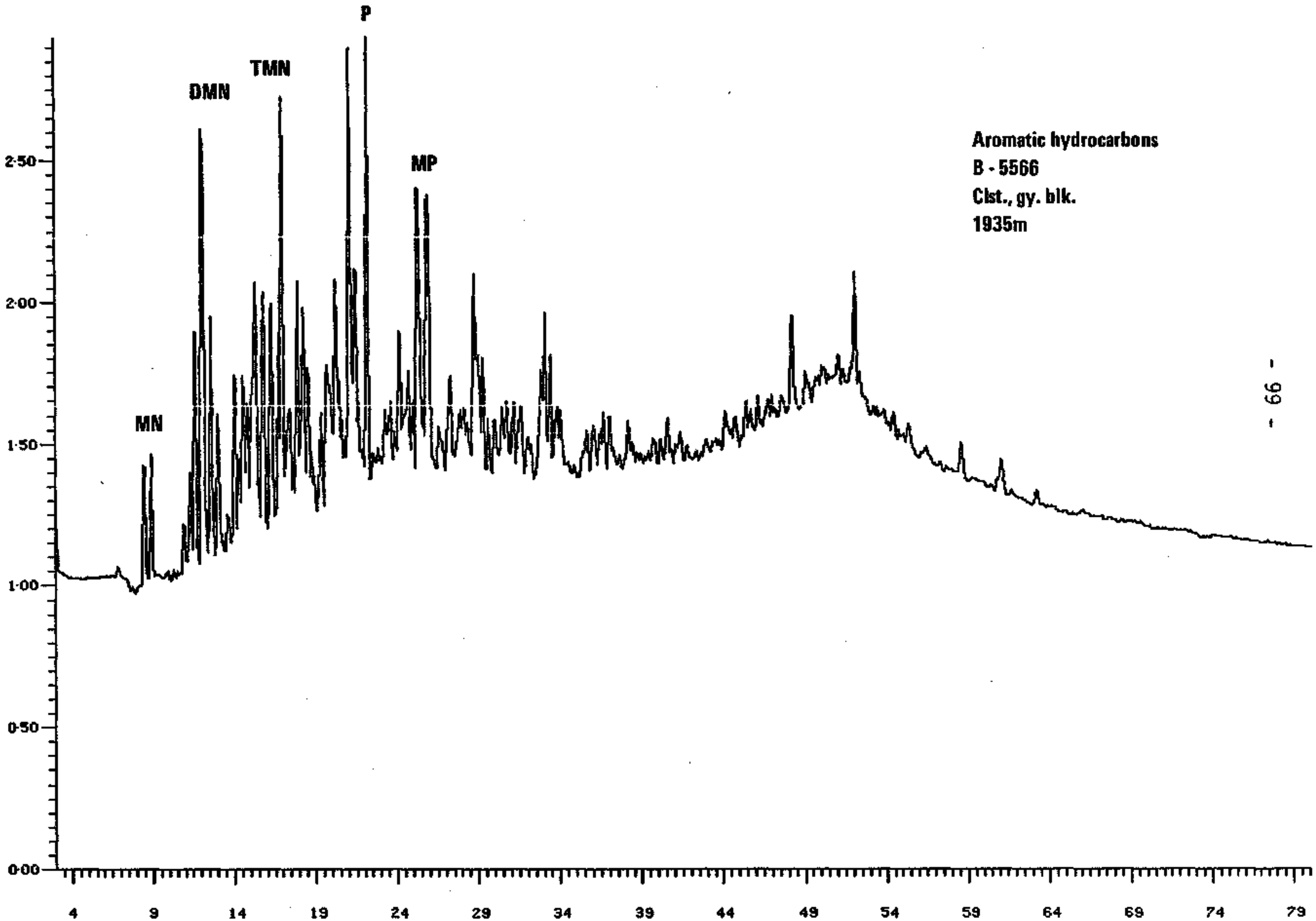
59
64
69
74
79


DATA PLOT-CHANNEL 2
Data Scale Plot
Box 1 of 1
Analysis :747B5564A Sample £: 1 Injection £: 1
Sample Name :B5564,7121/7-1,GH
Maximum signal (%) :4.256
MN
DMN
TMN
P
MP
Aromatic hydrocarbons
B - 5564
Clst., gy. blk.
1905m
4·00
3·50
3·00
2·50
2·00
1·50
1·00
0·50
0·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74
79

reated at 13:33 on 29/Oct/84

DATA PLOT-CHANNEL 2 Box 1 of 1
Data Scale Plot

Analysis :747B5566A Sample £: 1 Injection £: 1
Sample Name :B5566,7121/7-1,GH Maximum signal (%) :2.933



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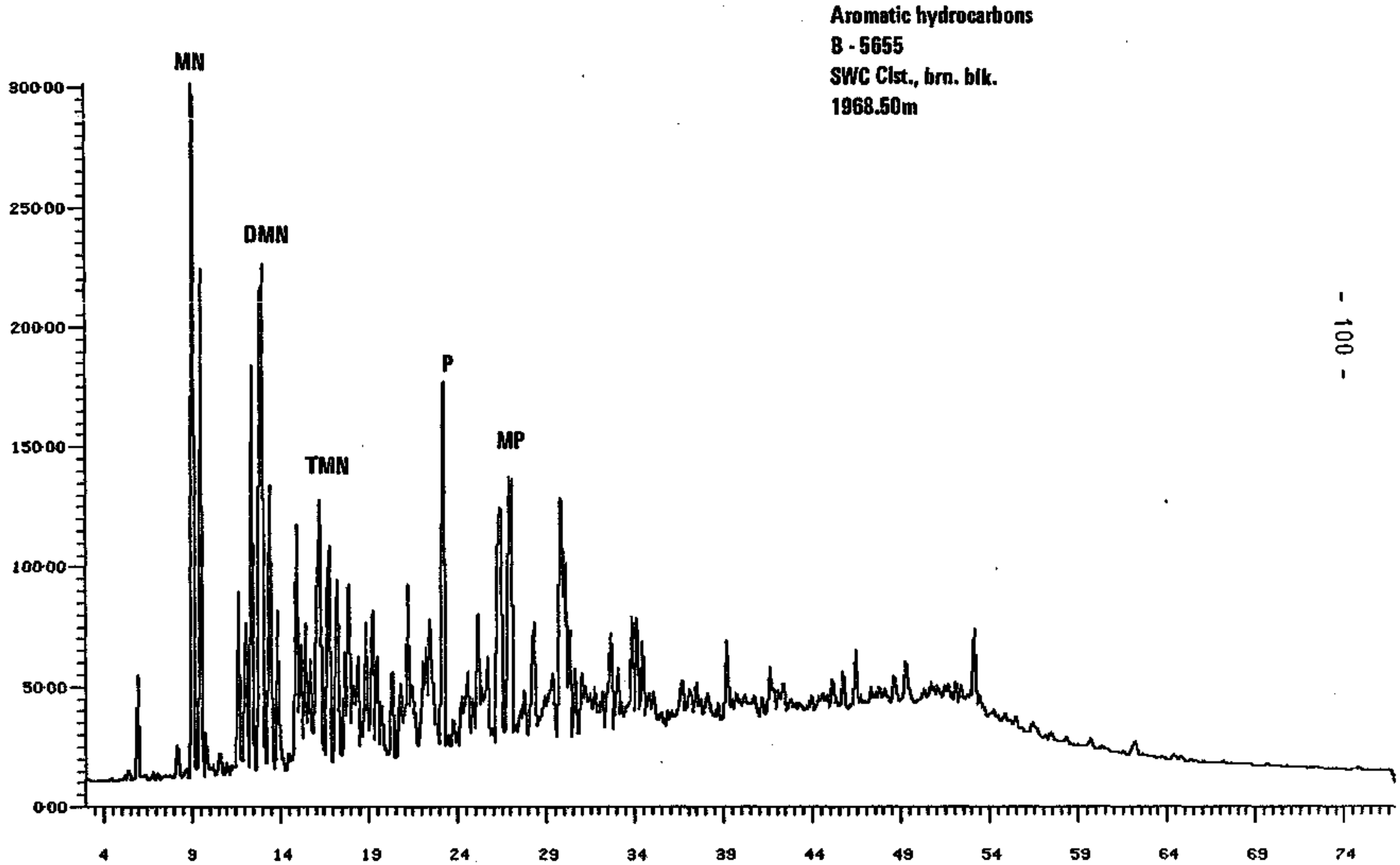
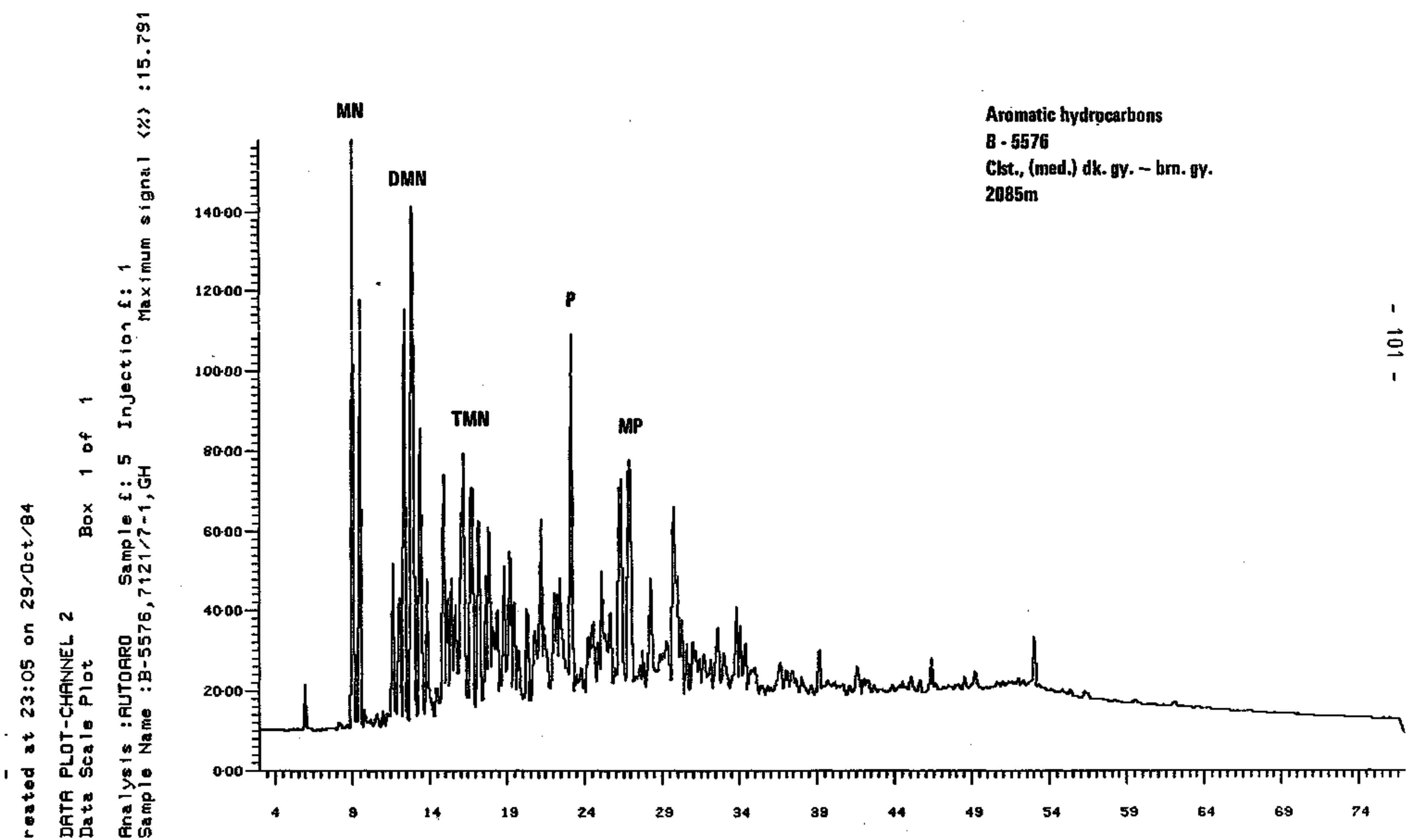
DATA PLOT-CHANNEL 2 Box 1 of 1
Data Scale Plot

Analysis :AUTOARO Sample £: 2 Injection £: 1
Sample Name :B-5655,7121/7-1,GH Maximum signal (%) :30.153

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DATA PLOT-CHANNEL 2
Data Scale Plot
Box 1 of 1
Analysis :AUTOARO
Sample £: 5
Injection £: 1
Sample Name :B-5576,7121/7-1,GH
Maximum signal (%) :15.791
Aromatic hydrocarbons
B - 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
MN
DMN
TMN
P
MP
0·00
20·00
40·00
60·00
80·00
100·00
120·00
140·00
4
9
14
19
24
29
34
39
44
49
54
59
64
69
74

reated at 12:49 on 30/Oct/84

DATA PLOT-CHANNEL 2
Data Scale Plot Box 1 of 1

Analysis :747B5580A Sample £: 1 Injection £: 1
Sample Name :B5580,7121/7-1,GH Maximum signal (%) :5.146

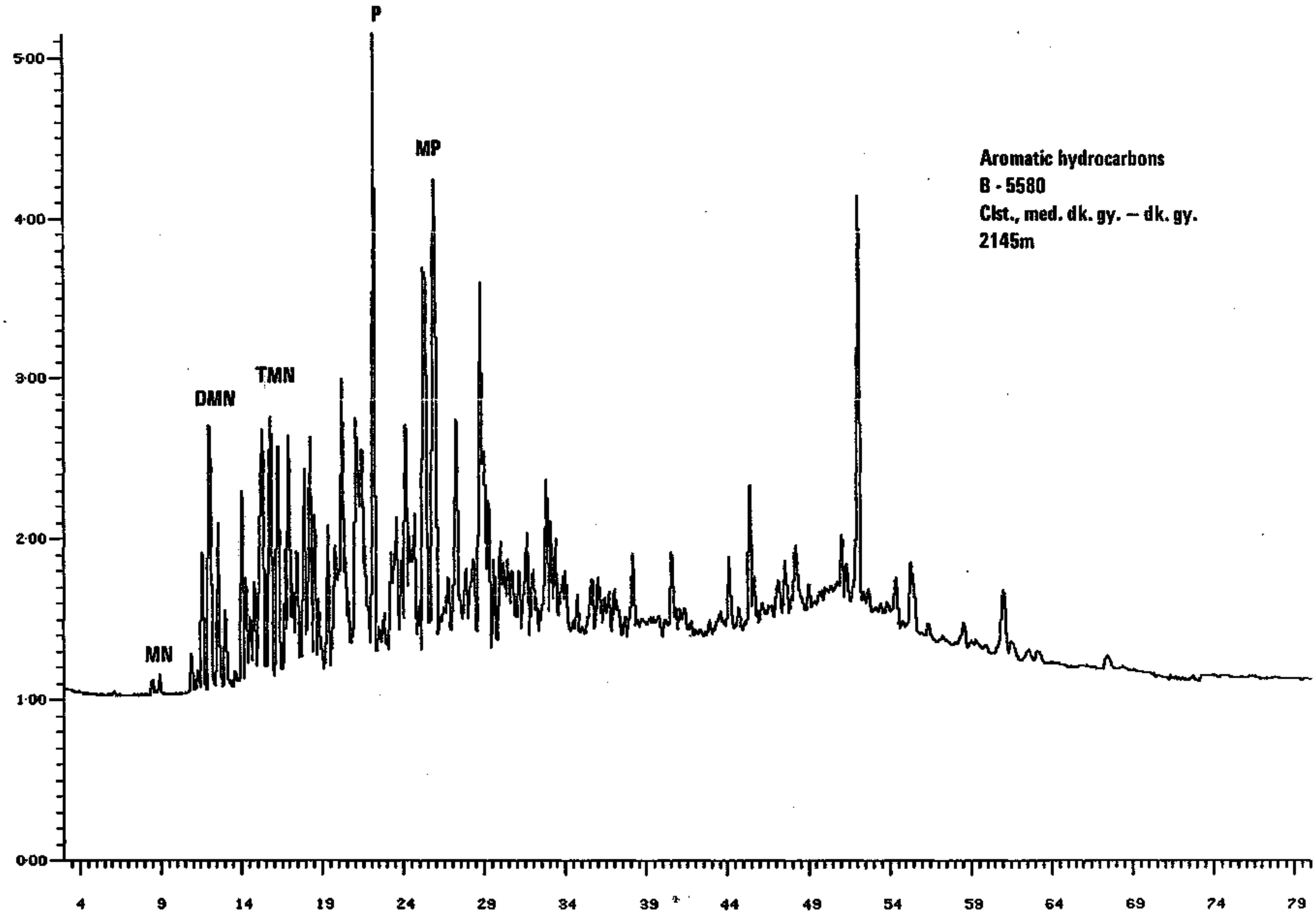


FIGURE 3

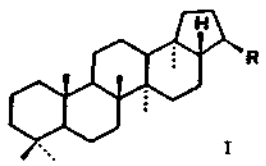
Mass chromatograms of saturated hydrocarbons

(Code annotation, see next page)

Figure 3.

Mass chromatograms representing terpanes (m/z 191)

A	T_s, 18α(H)-trisnorneohopane	$C_{27}H_{46}$	(III)
B	T_m, 17α(H)-trisnorhopane	$C_{27}H_{46}$	(I,R=H)
C	17α(H)-norhopane	$C_{29}H_{50}$	(I,R=C_2H_5)
D	17β(H)-normoretane	$C_{29}H_{50}$	(II,R=C_2H_5)
E	17α(H)-hopane	$C_{30}H_{52}$	(I,R=C_3H_7)
F	17β(H)-moretane	$C_{30}H_{52}$	(II,R=C_3H_7)
G	17α(H)-homohopane (22S)	$C_{31}H_{54}$	(I,R=C_4H_9)
H	17α(H)-homohopane (22R) + unknown triterpane (gammacerane?)	$C_{31}H_{54}$	(I,R=C_4H_9)
I	17β(H)-homomoretane	$C_{31}H_{54}$	(II,R=C_4H_9)
J	17α(H)-bishomohopane (22S,22R)	$C_{32}H_{56}$	(I,R=C_5H_{11})
K	17α(H)-trishomohopane (22S,22R)	$C_{33}H_{58}$	(I,R=C_6H_{13})
L	17α(H)-tetrakishomohopane (22S,22R)	$C_{34}H_{60}$	(I,R,=C_7H_{15})
M	17α(H)-pentakishomohopane (22S,22R)	$C_{35}H_{62}$	(I,R=C_8H_{17})
Z	bisnorhopane	$C_{28}H_{48}$	
X	unknown triterpane	$C_{30}H_{52}$	
P	tricyclic terpane	$C_{23}H_{42}$	(IV,R=C_4H_9)
Q	tricyclic terpane	$C_{24}H_{44}$	(IV,R=C_5H_{11})
R	tricyclic terpane (17R,17S)	$C_{25}H_{46}$	(IV,R=C_6H_{13})
S	tetracyclic terpane	$C_{24}H_{42}$	(V)
T	tricyclic terpane (17R,17S)	$C_{26}H_{48}$	(IV,R=C_7H_{15})



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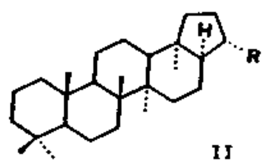

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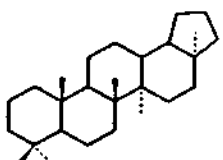

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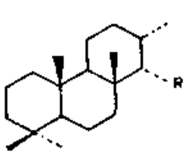


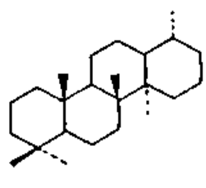
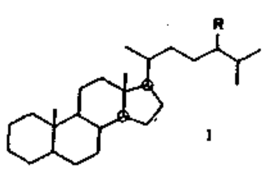


Figure 3.

Mass chromatograms representing steranes (m/z 217 and 218)

a	13β(H),17α(H)-diasterane (20S)	$C_{27}H_{48}$	(III,R=H)
b	13β(H),17α(H)-diasterane (20R)	$C_{27}H_{48}$	(III,R=H)
c	13α(H),17β(H)-diasterane (20S)	$C_{27}H_{48}$	(IV,R=H)
d	13α(H),17β(H)-diasterane (20R)	$C_{27}H_{48}$	(IV,R=H)
e	13β(H),17α(H)-diasterane (20S)	$C_{28}H_{50}$	(III,R=CH_3)
f	13β(H),17α(H)-diasterane (20R)	$C_{28}H_{50}$	(III,R=CH_3)
g	13α(H),17β(H)-diasterane (20S)	$C_{28}H_{50}$	(IV,R=CH_3)
	+ 14α(H),17α(H)-sterane (20S)	$C_{27}H_{48}$	(I,R=H)
h	13β(H),17α(H)-diasterane (20S)	$C_{29}H_{52}$	(III,R=C_2H_5)
	+ 14β(H),17β(H)-sterane (20R)	$C_{27}H_{48}$	(II,R=H)
i	14β(H),17β(H)-sterane (20S)	$C_{27}H_{48}$	(II,R=H)
	+ 13α(H),17β(H)-diasterane (20R)	$C_{28}H_{50}$	(IV,R=CH_3)
j	14α(H),17α(H)-sterane (20R)	$C_{27}H_{48}$	(I,R=H)
k	13β(H),17α(H)-diasterane (20R)	$C_{29}H_{52}$	(III,R=C_2H_5)
l	13α(H),17β(H)-diasterane (20S)	$C_{29}H_{52}$	(III,R=C_2H_5)
m	14α(H),17α(H)-sterane (20S)	$C_{28}H_{50}$	(I,R=CH_3)
n	13α(H),17β(H)-diasterane (20R)	$C_{29}H_{52}$	(III,R=C_2H_5)
	+ 14β (H),17β (H)-sterane (20R)	$C_{28}H_{50}$	(II,R=CH_3)
o	14β(H),17β(H)-sterane (20S)	$C_{28}H_{50}$	(II,R=CH_3)
p	14α(H),17α(H)-sterane (20R)	$C_{28}H_{50}$	(I,R=CH_3)
q	14α(H),17α(H)-sterane (20S)	$C_{29}H_{52}$	(I,R=C_2H_5)
r	14β(H),17β(H)-sterane (20R)	$C_{29}H_{52}$	(II,R=C_2H_5)
	+ unknown sterane		
s	14β(H),17β(H)-sterane (20S)	$C_{29}H_{52}$	(II,R=C_2H_5)
t	14β(H),17β(H)-sterane (20R)	$C_{29}H_{52}$	(I,R=C_2H_5)
u	5α(H)-sterane	$C_{21}H_{36}$	(V,R=C_2H_5)
v	5α(H)-sterane	$C_{22}H_{38}$	(IV,R=C_3H_7)



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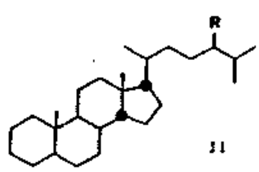

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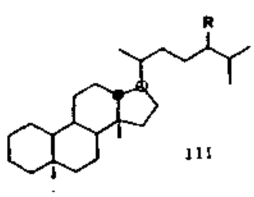

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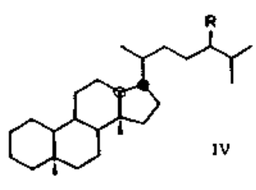

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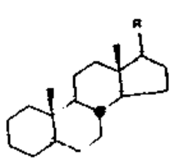

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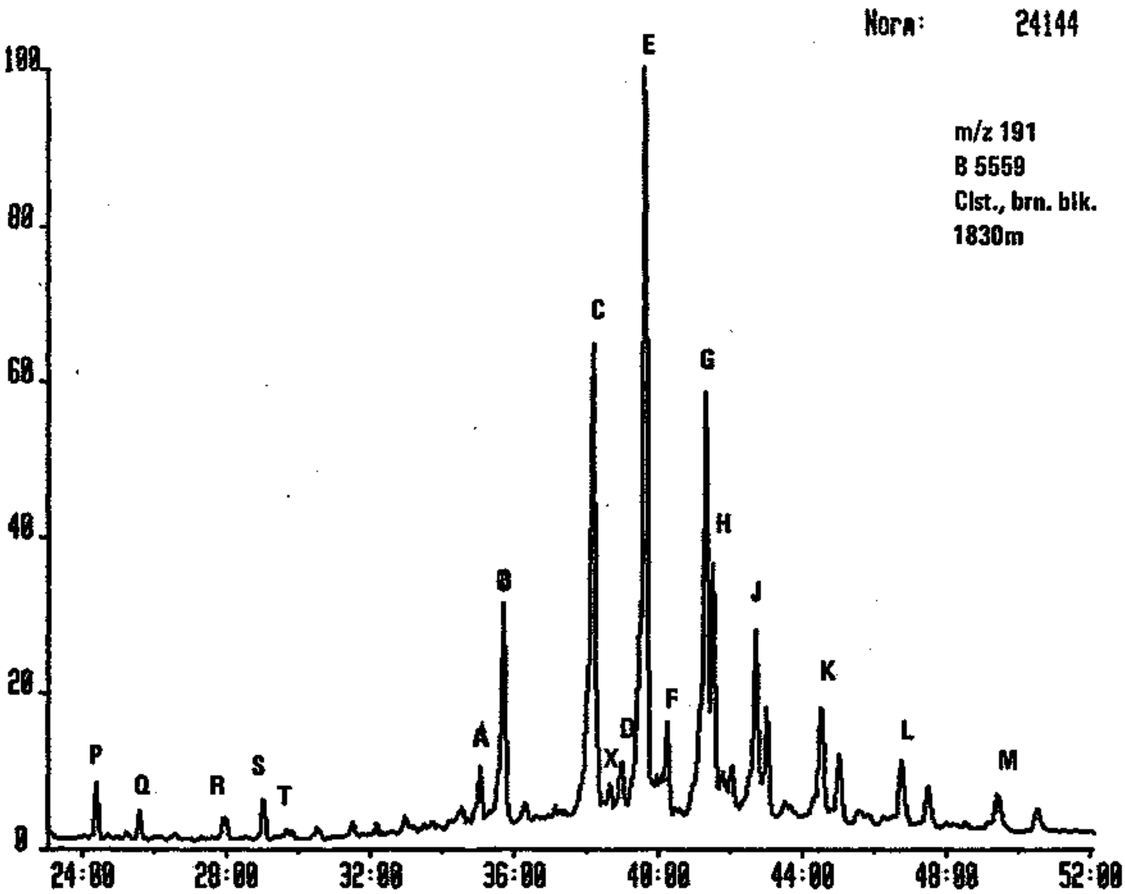
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32:00
36:00
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44:00
48:00
52:00
P
Q
R
S
T
A
B
C
X
D
E
F
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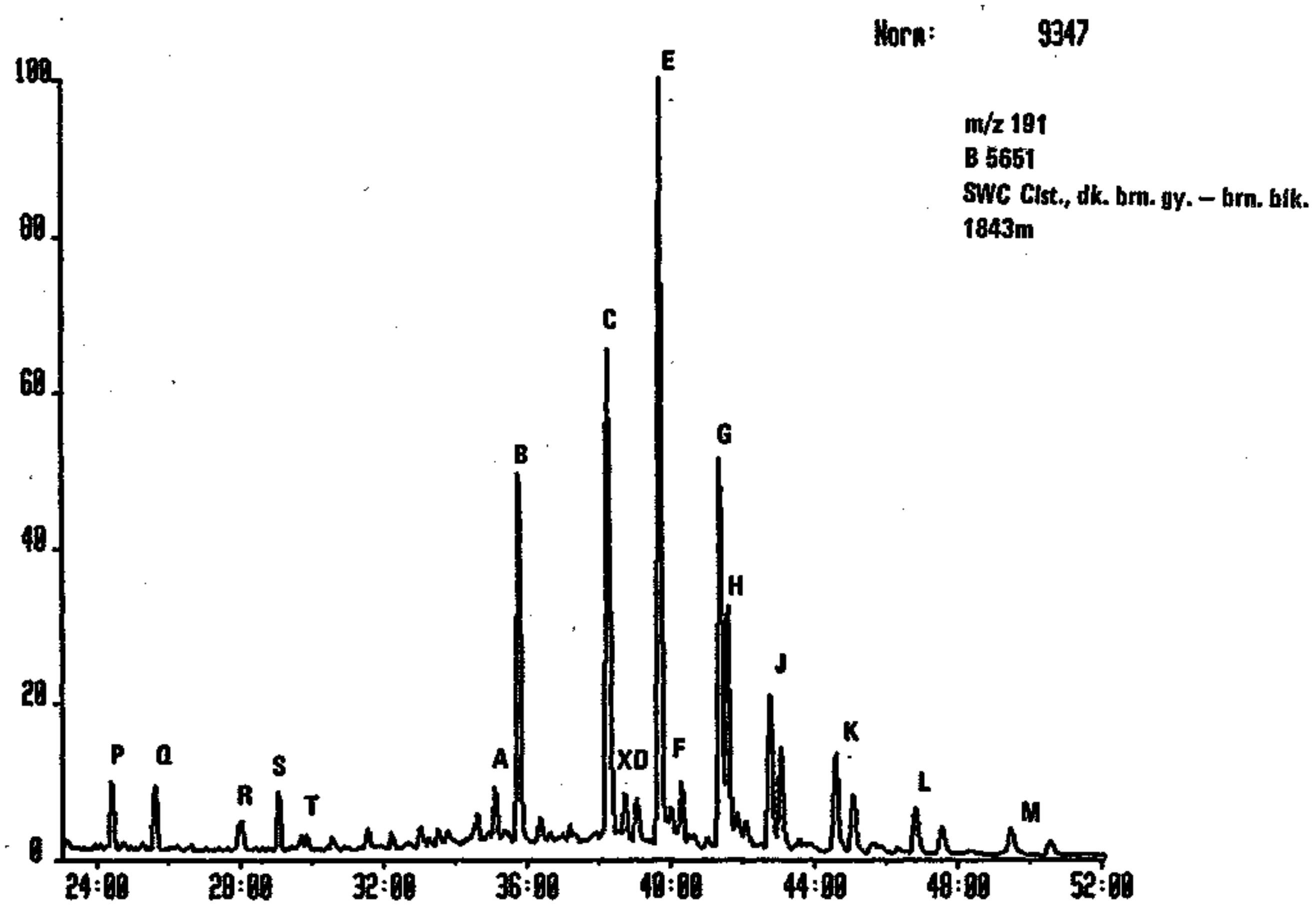
J
K
L
M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36:00
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44:00
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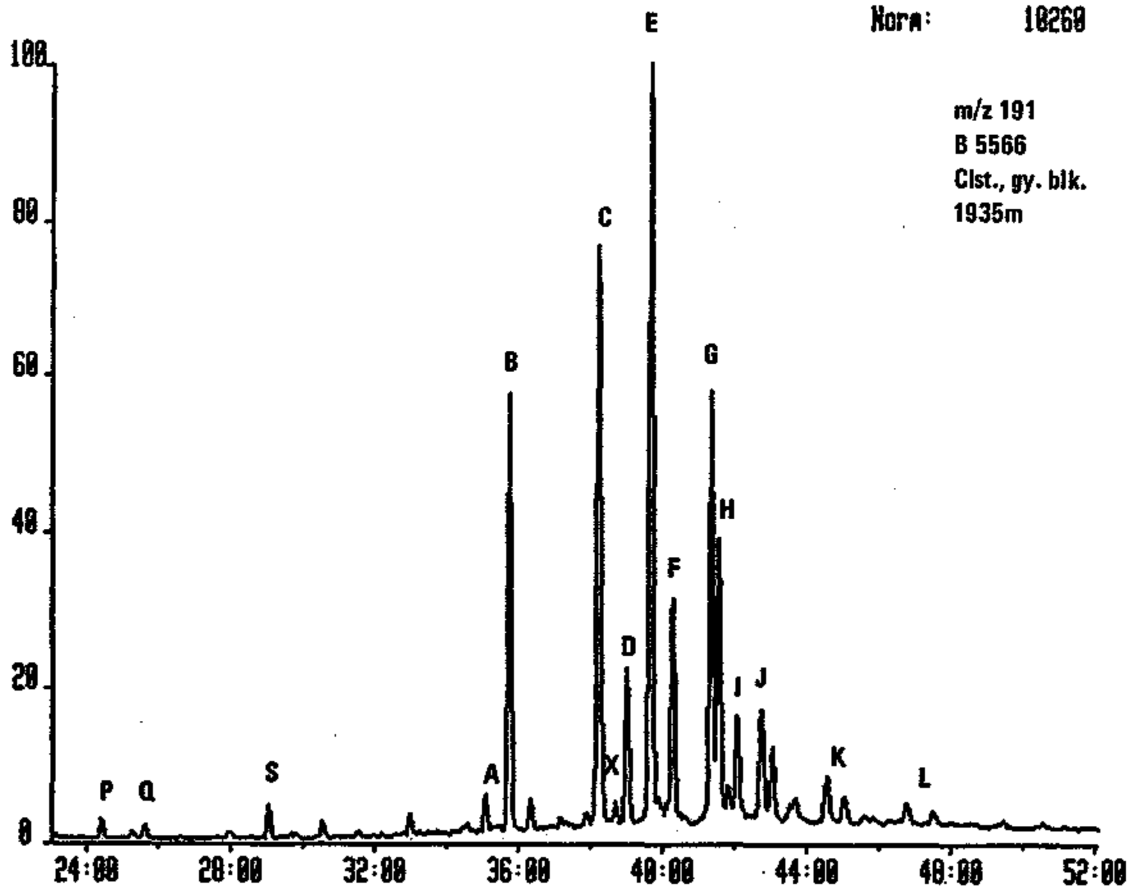
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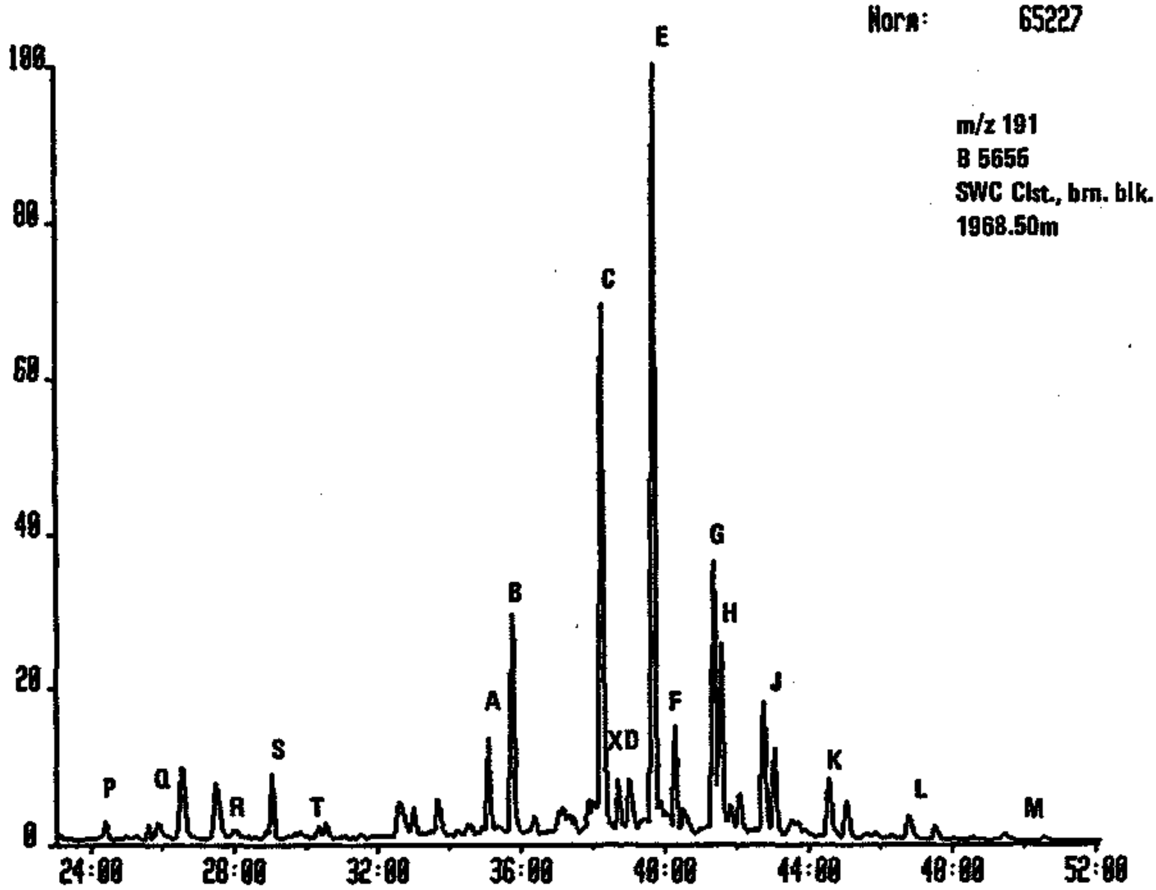
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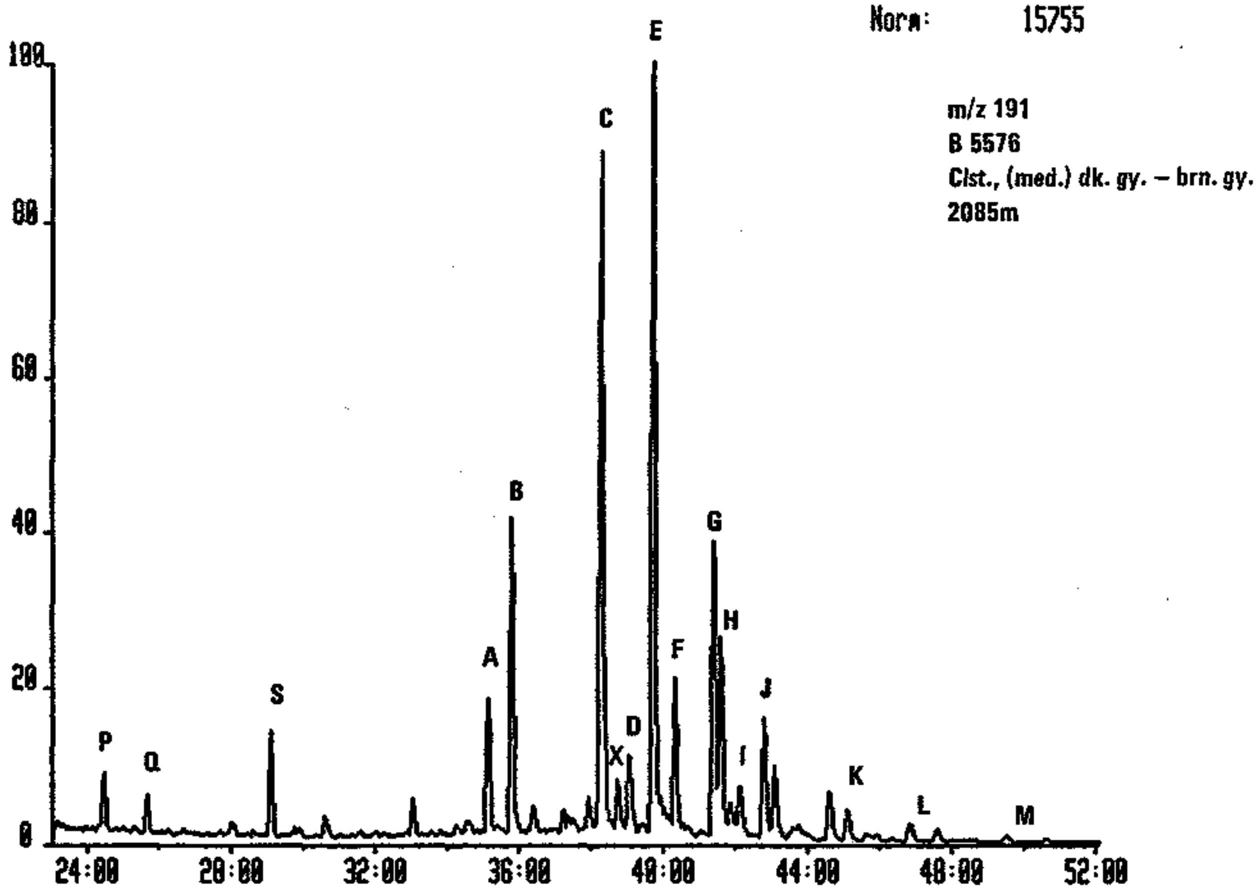
IKU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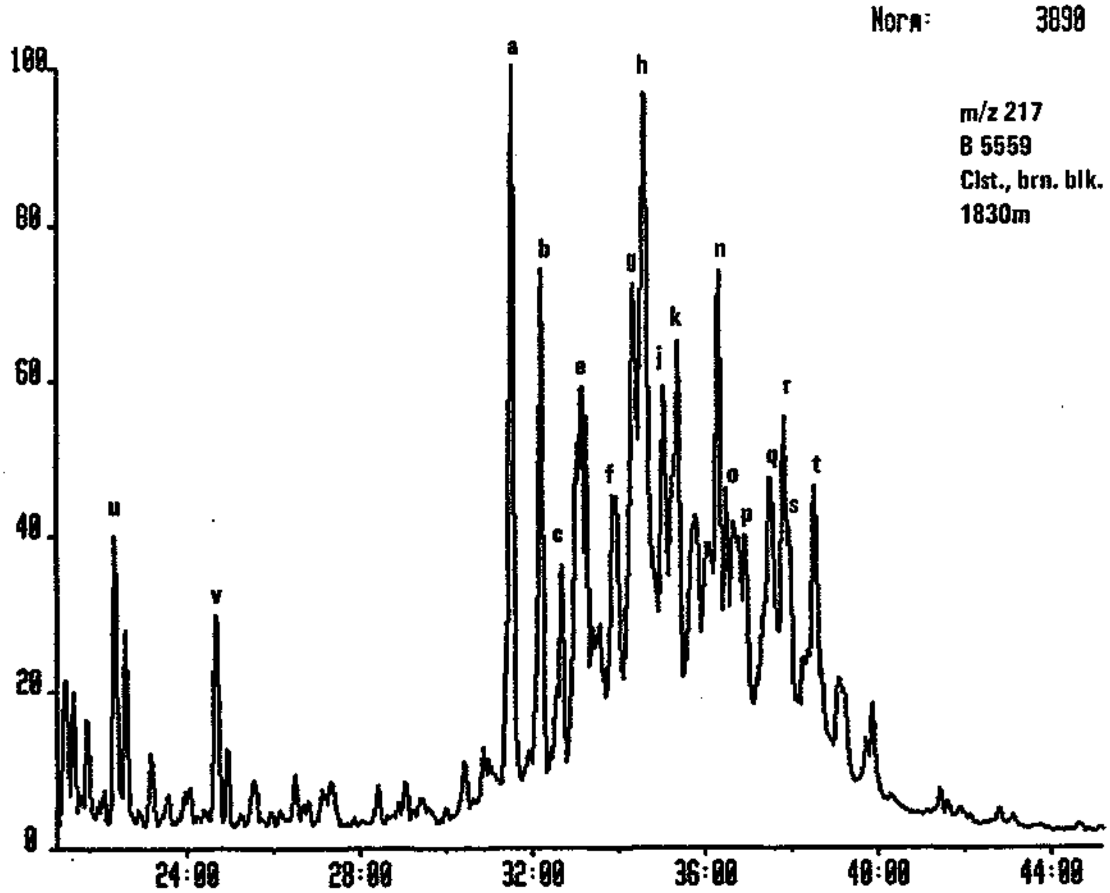
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Clst., brn. blk.
1830m
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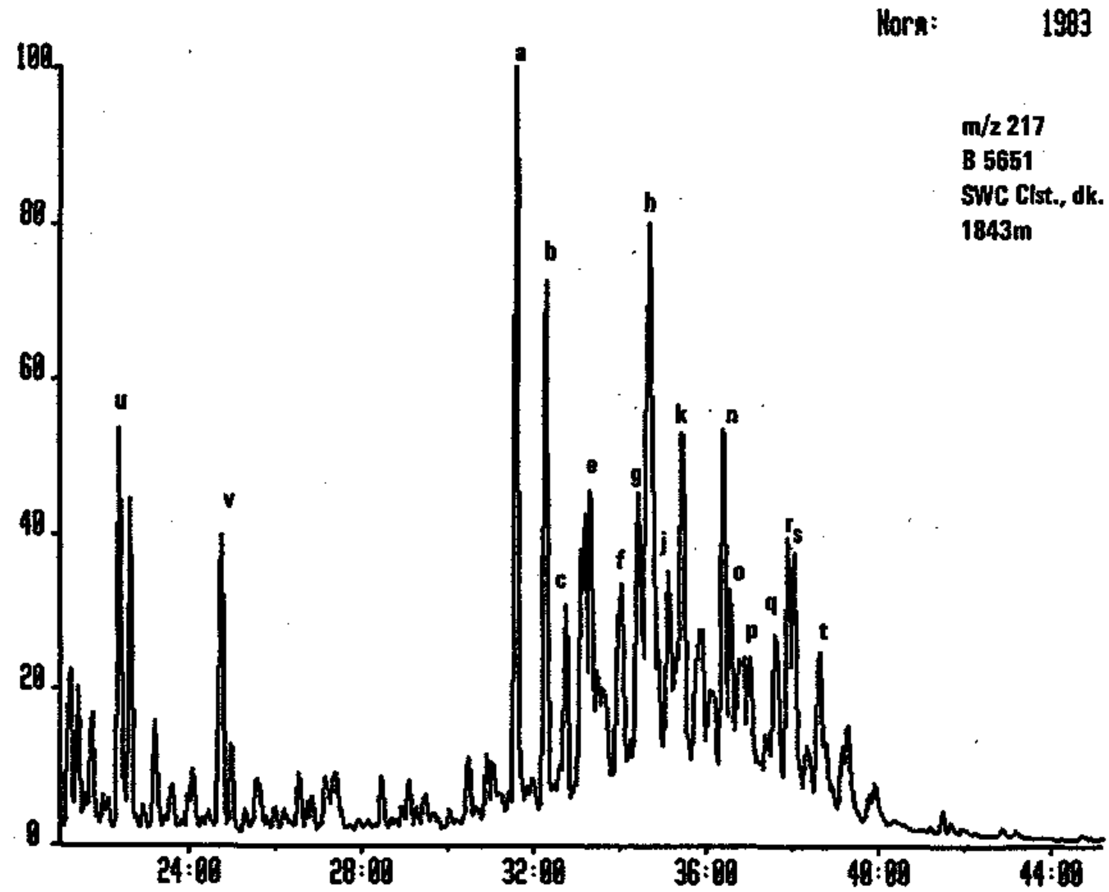
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B 5651
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1843m
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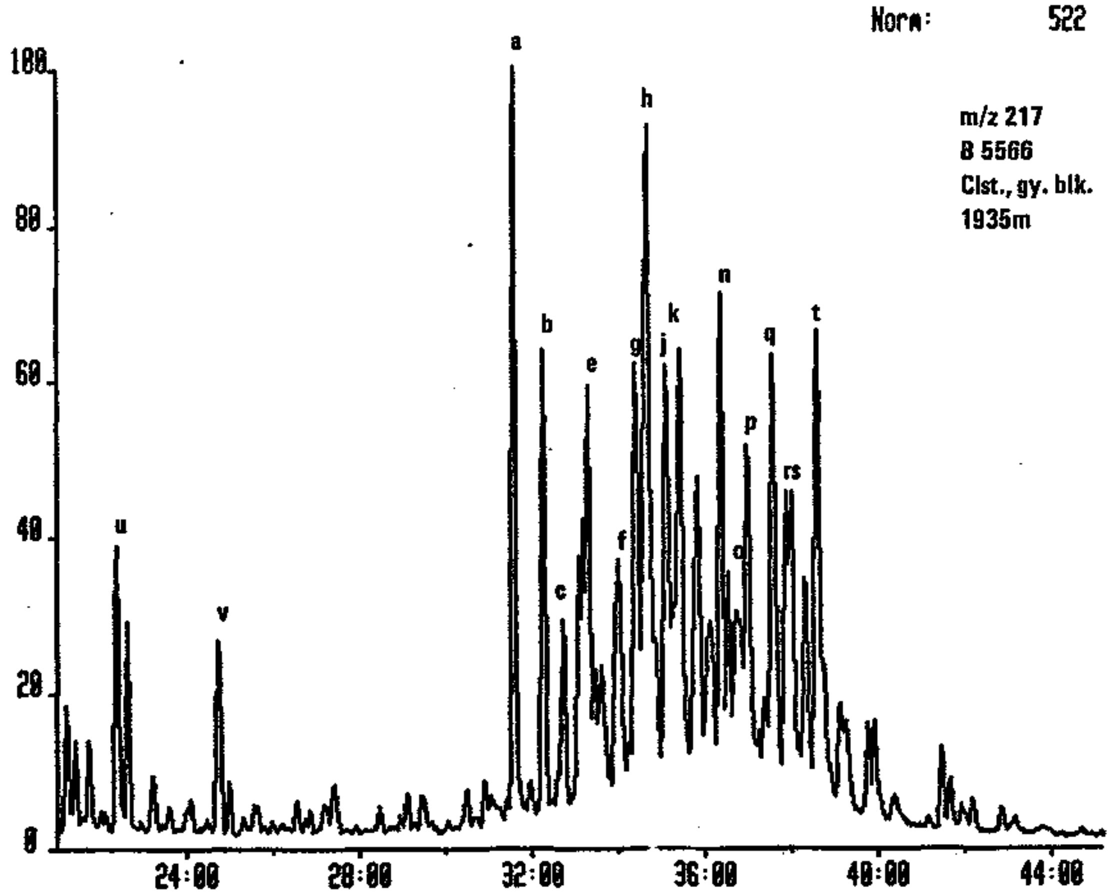
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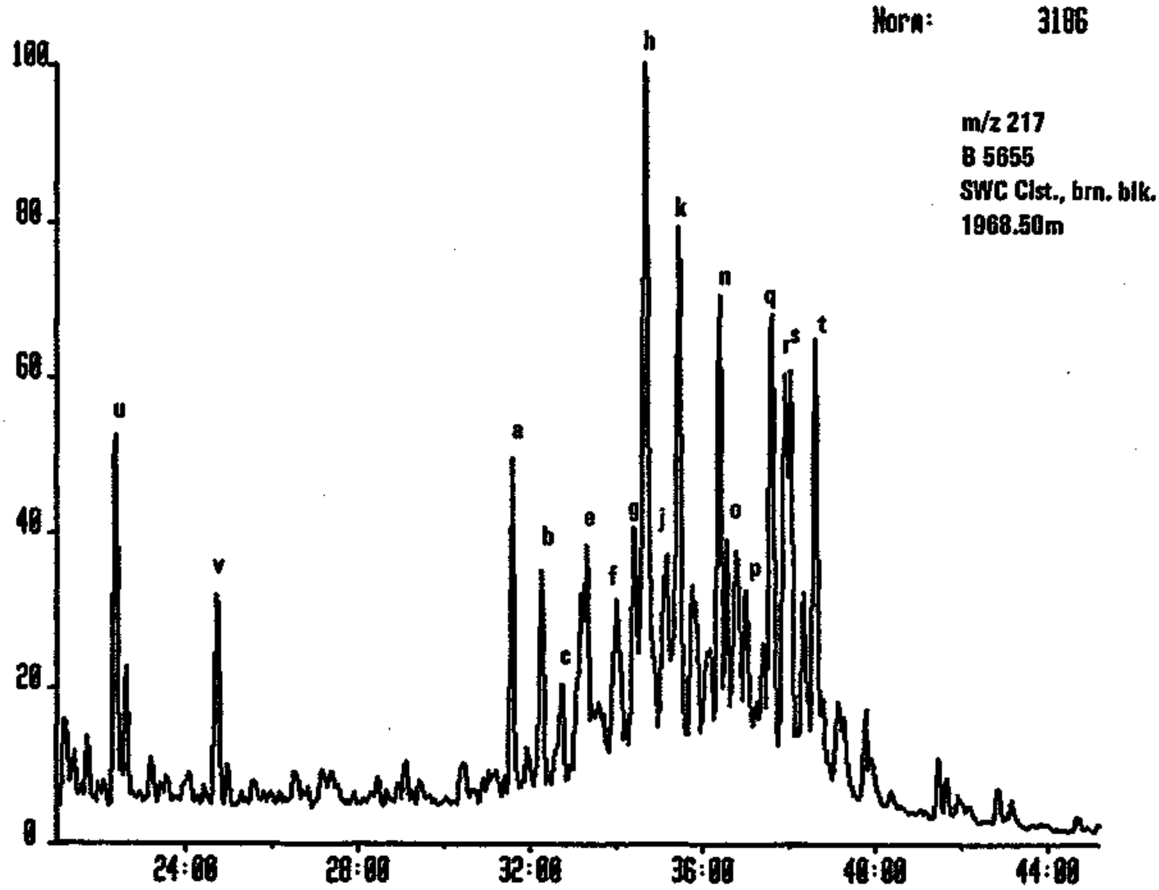
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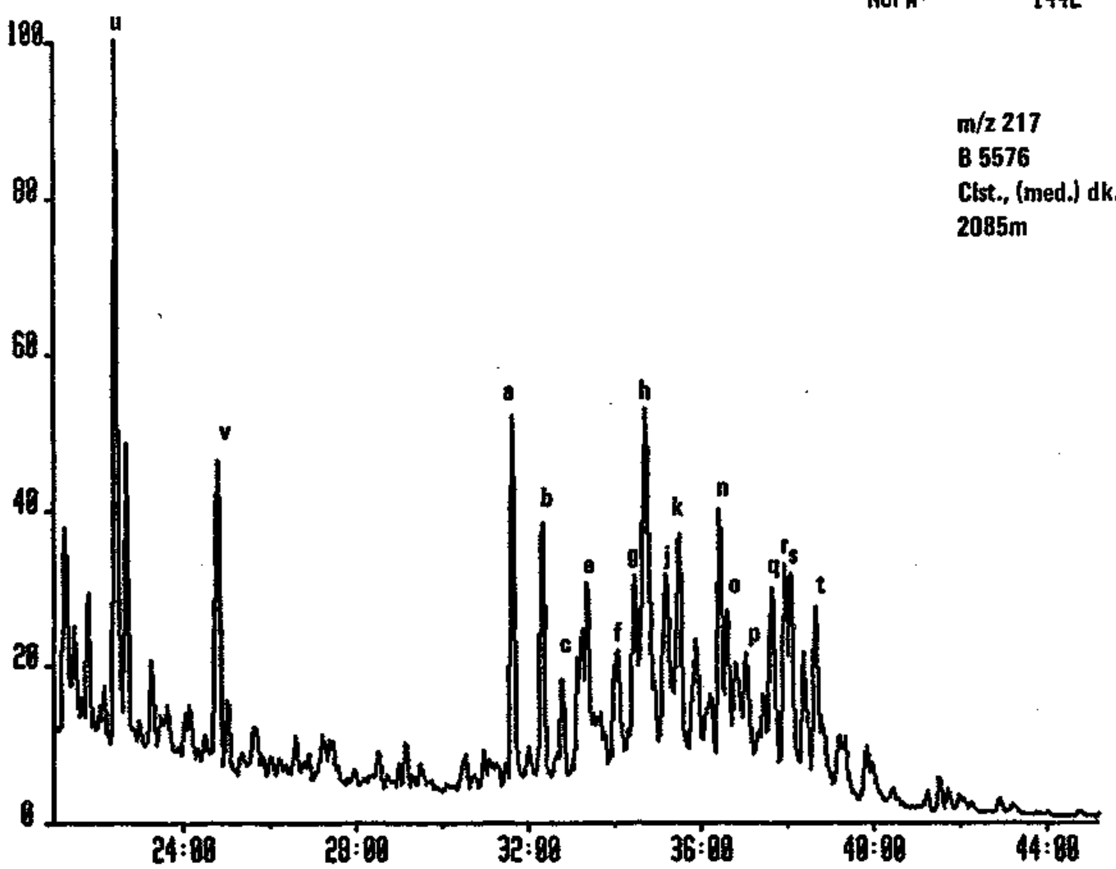
IKU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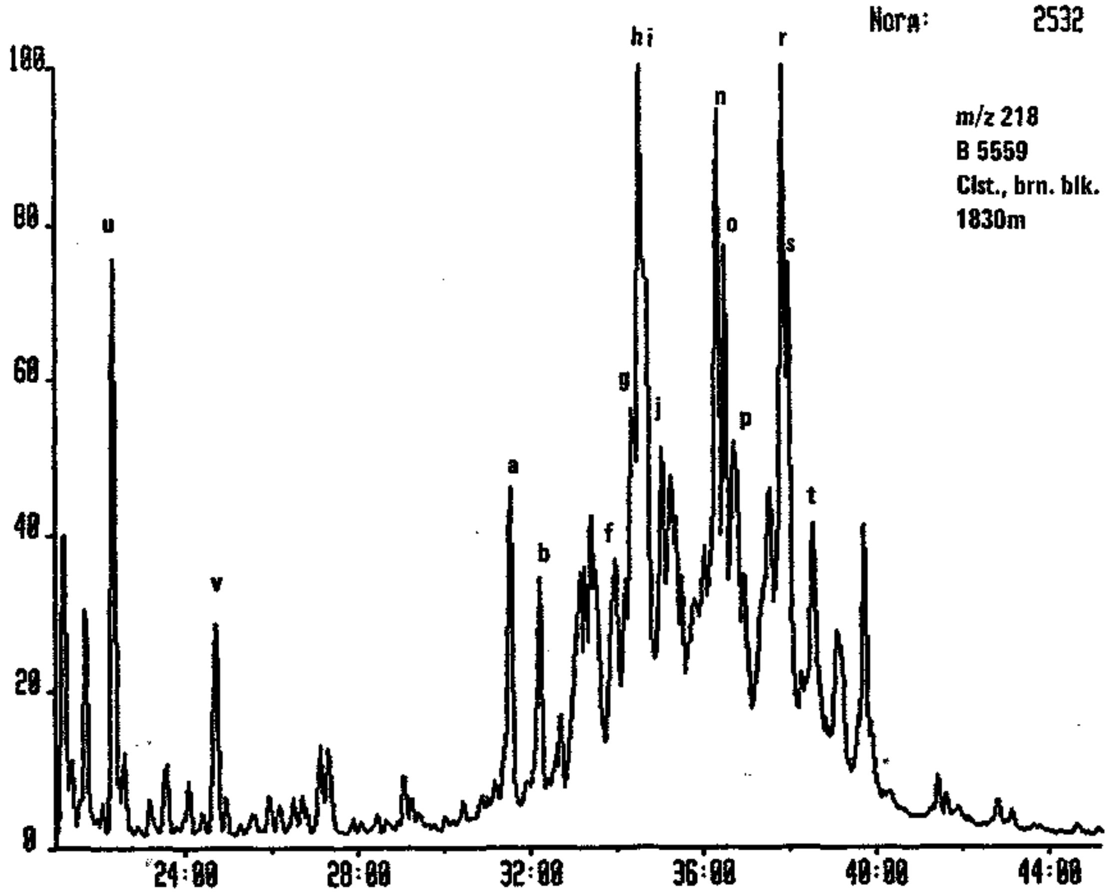
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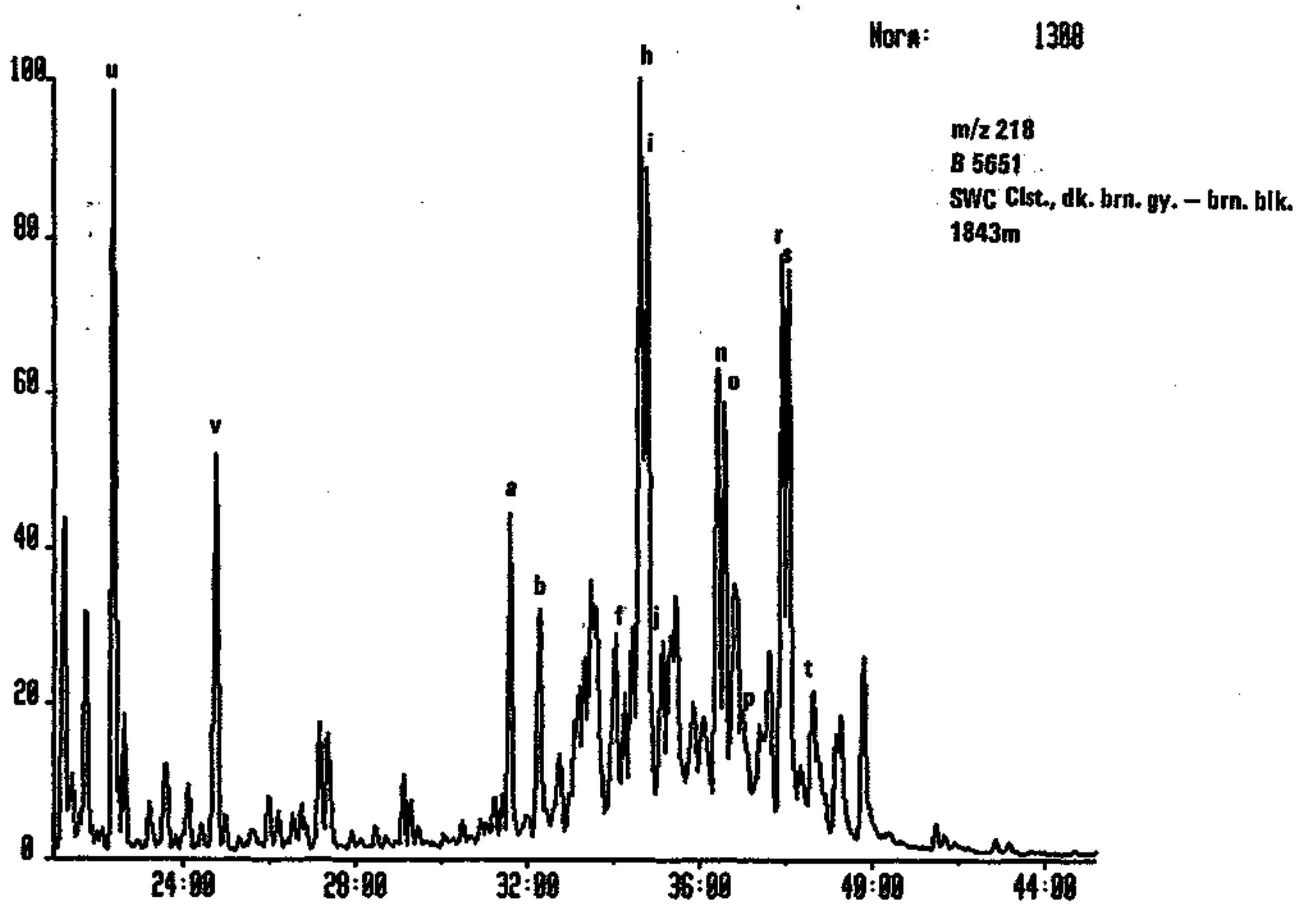
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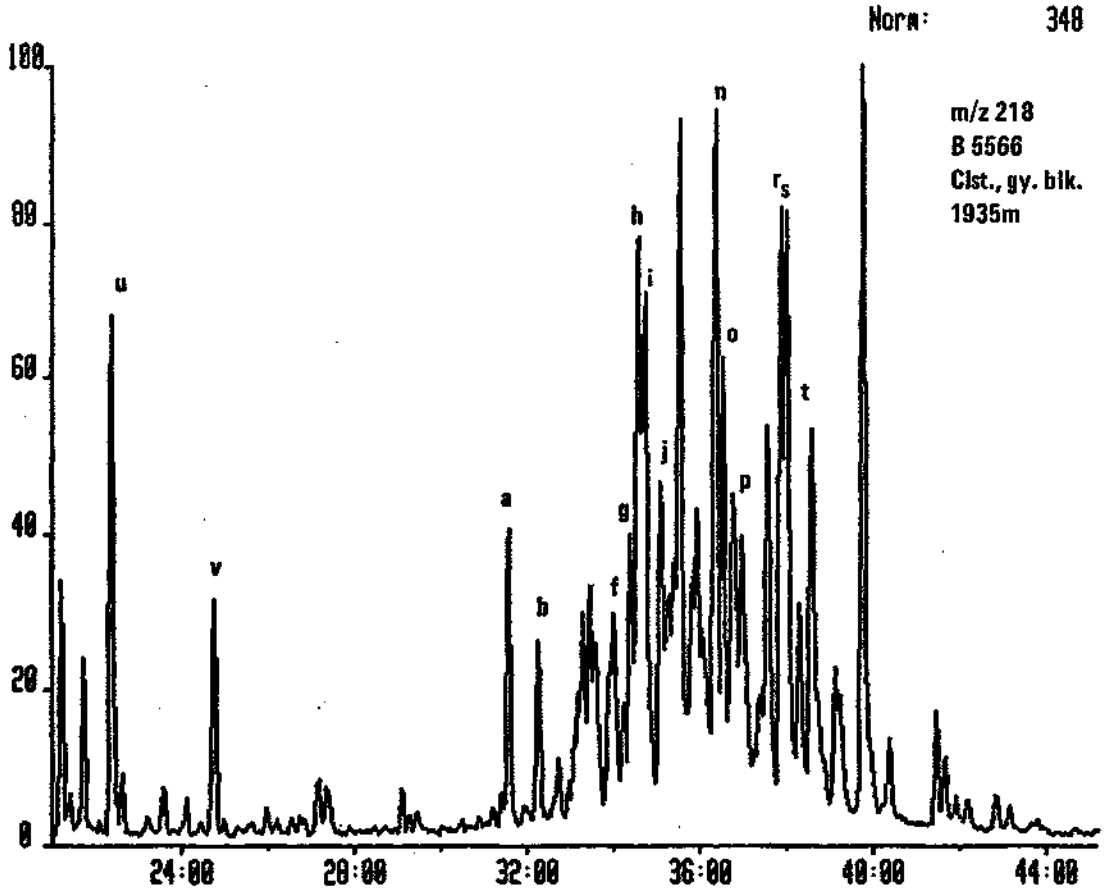
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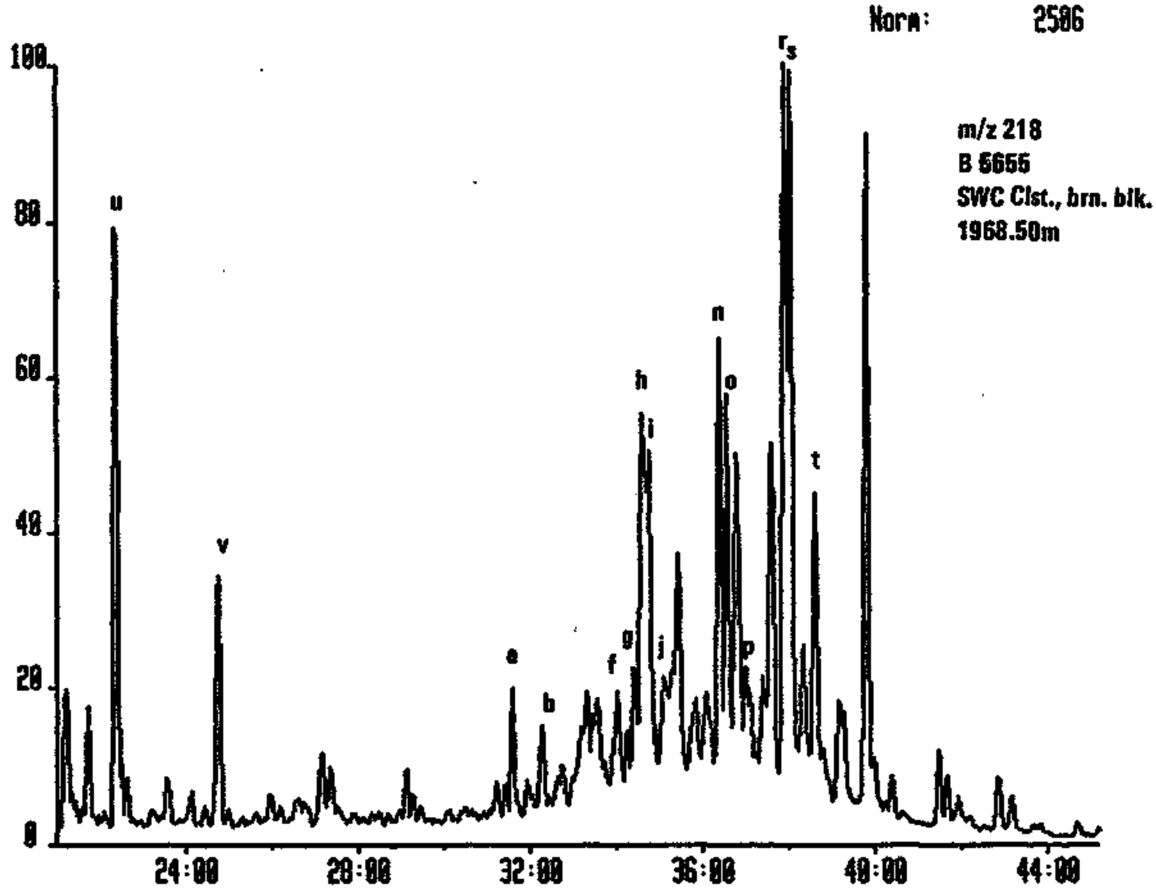
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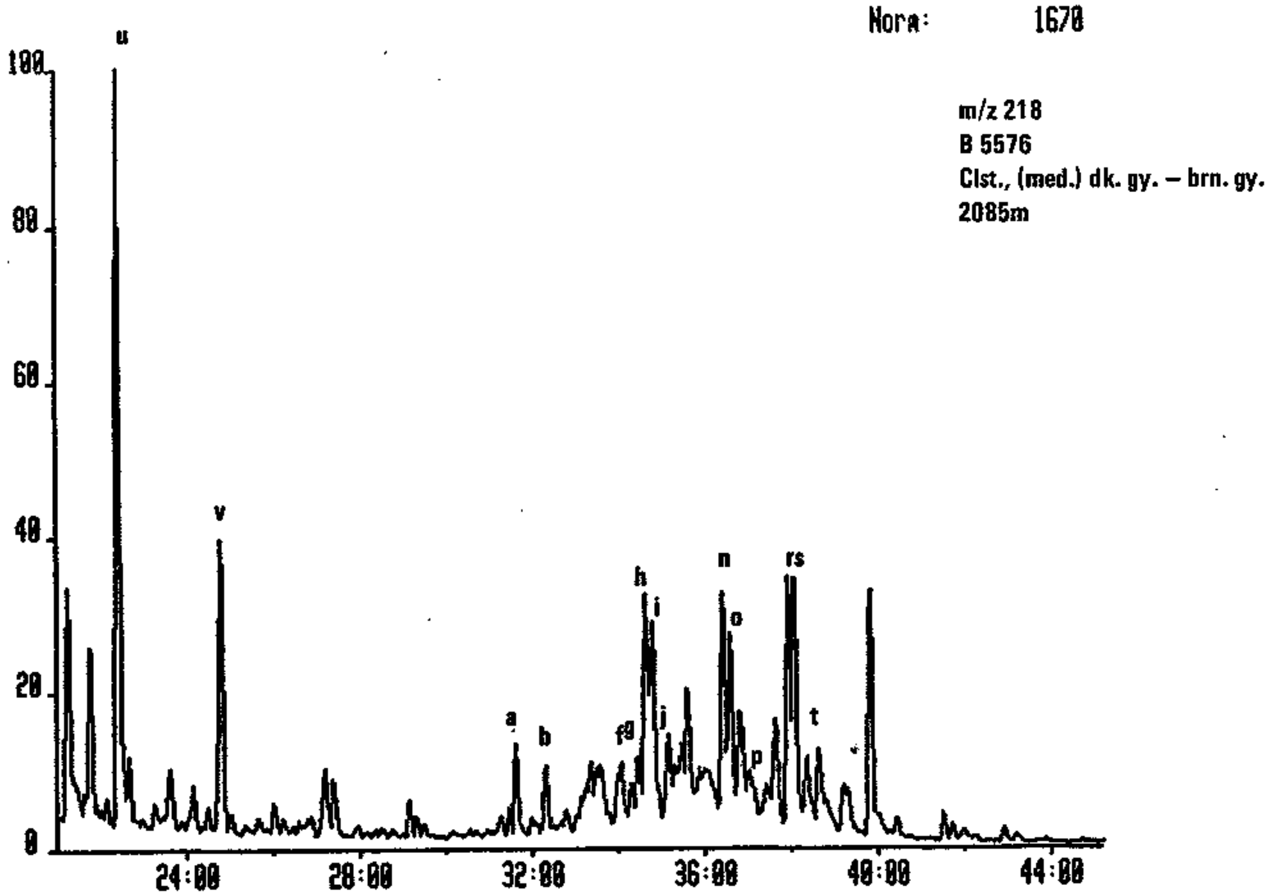
IKU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v
a
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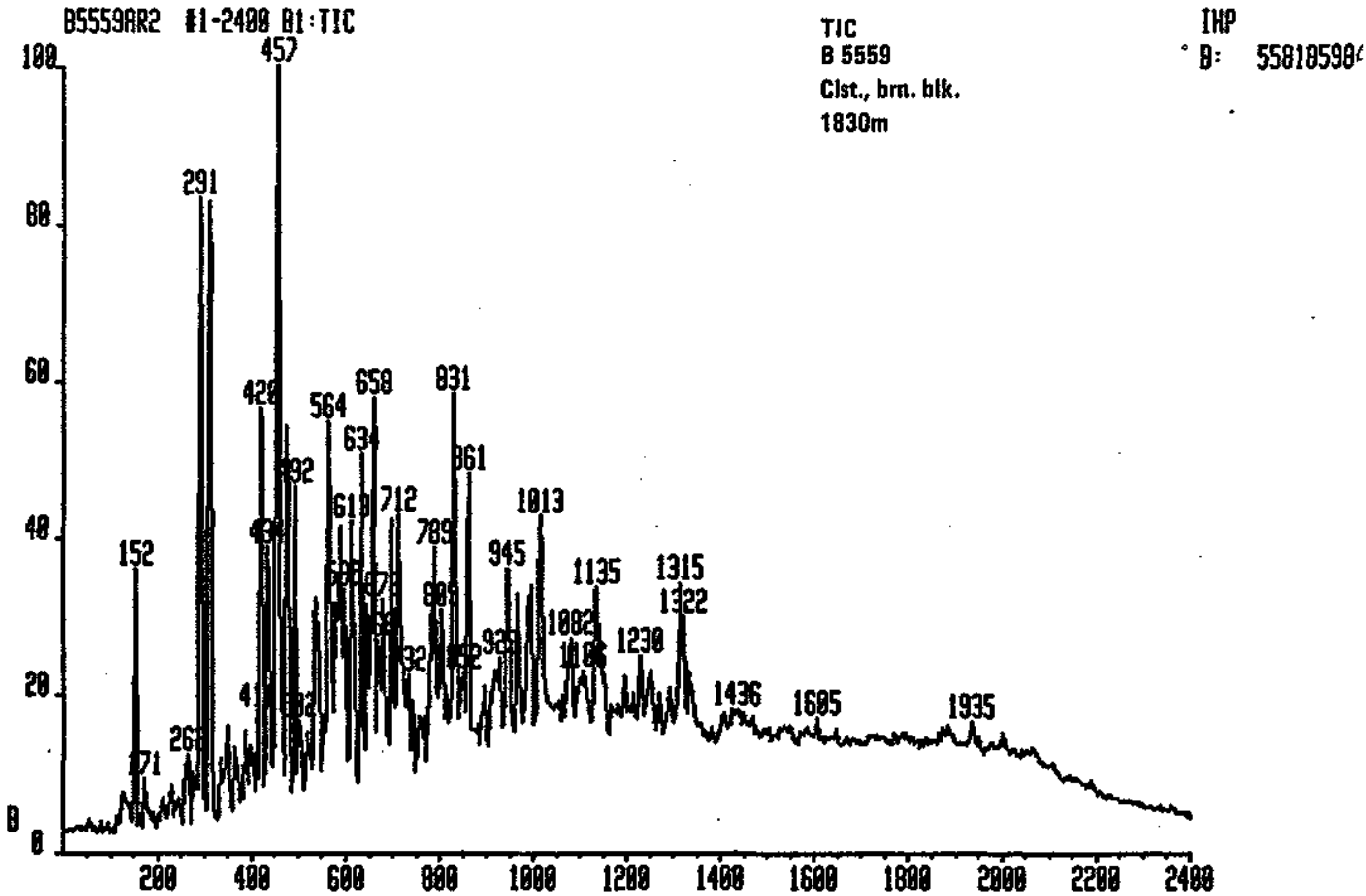
fg
h
i
j
n
o
p
rs
t
100
80
60
40
20
0
24:00
28:00
32:00
36:00
40:00
44:00

FIGURE 4

Mass chromatograms of aromatic hydrocarbons

TIC	- total ion chromatograms
m/z 92,106	- monoaromatic hydrocarbons
m/z 142,156,170	- alkylated naphthalenes
m/z 166, 180	- alkylated fluorenes
m/z 178,192,206	- alkylated phenanthrenes
m/z 184,198,212	- alkylated dibenzothiophenes
m/z 202	- pyrene, fluoranthene
m/z 231	- triaromatic steranes
m/z 253	- monoaromatic steranes

IKU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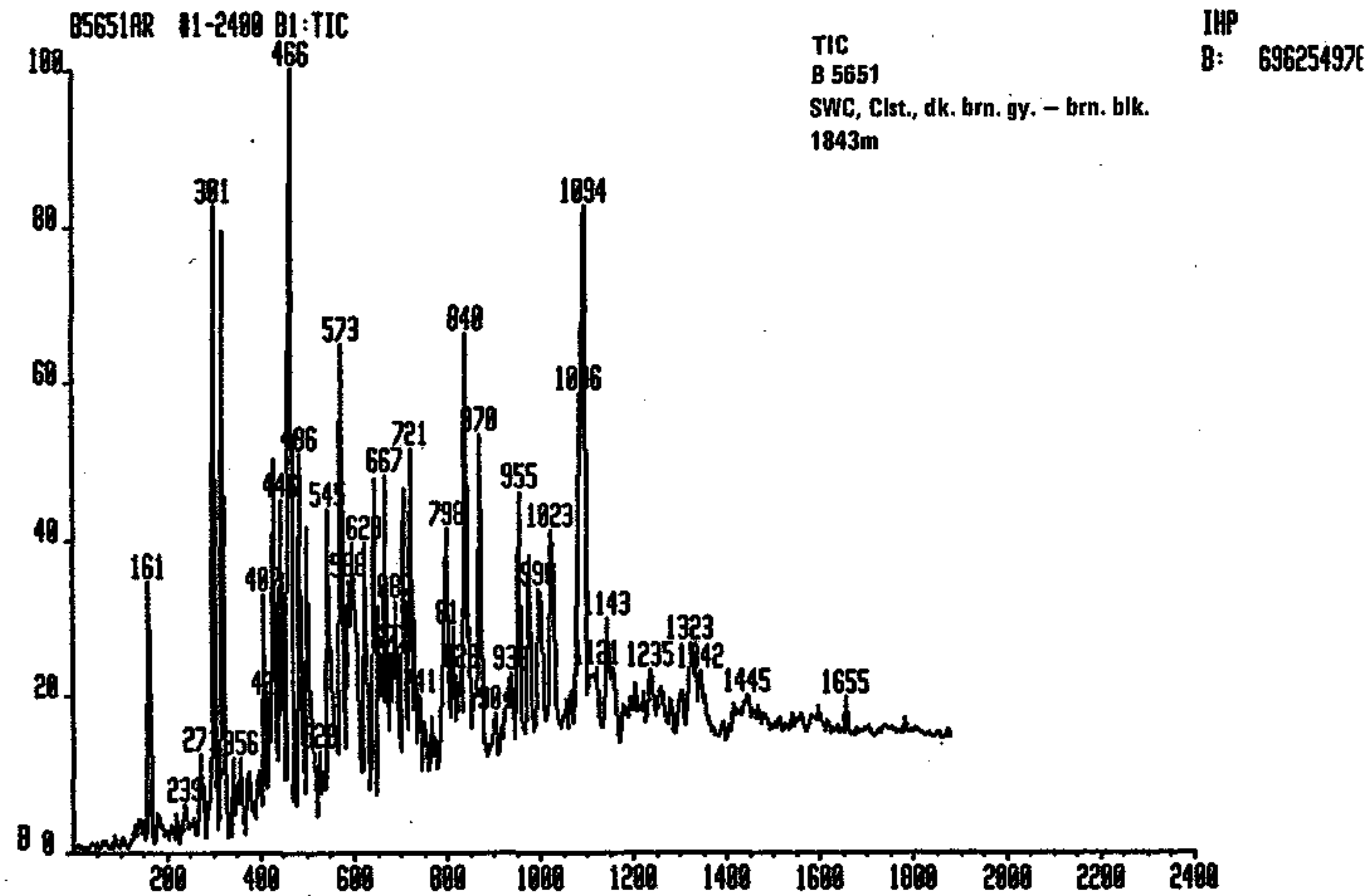
TIC
B 5559
Clst., brn. blk.
1830m
IHP
B: 55810598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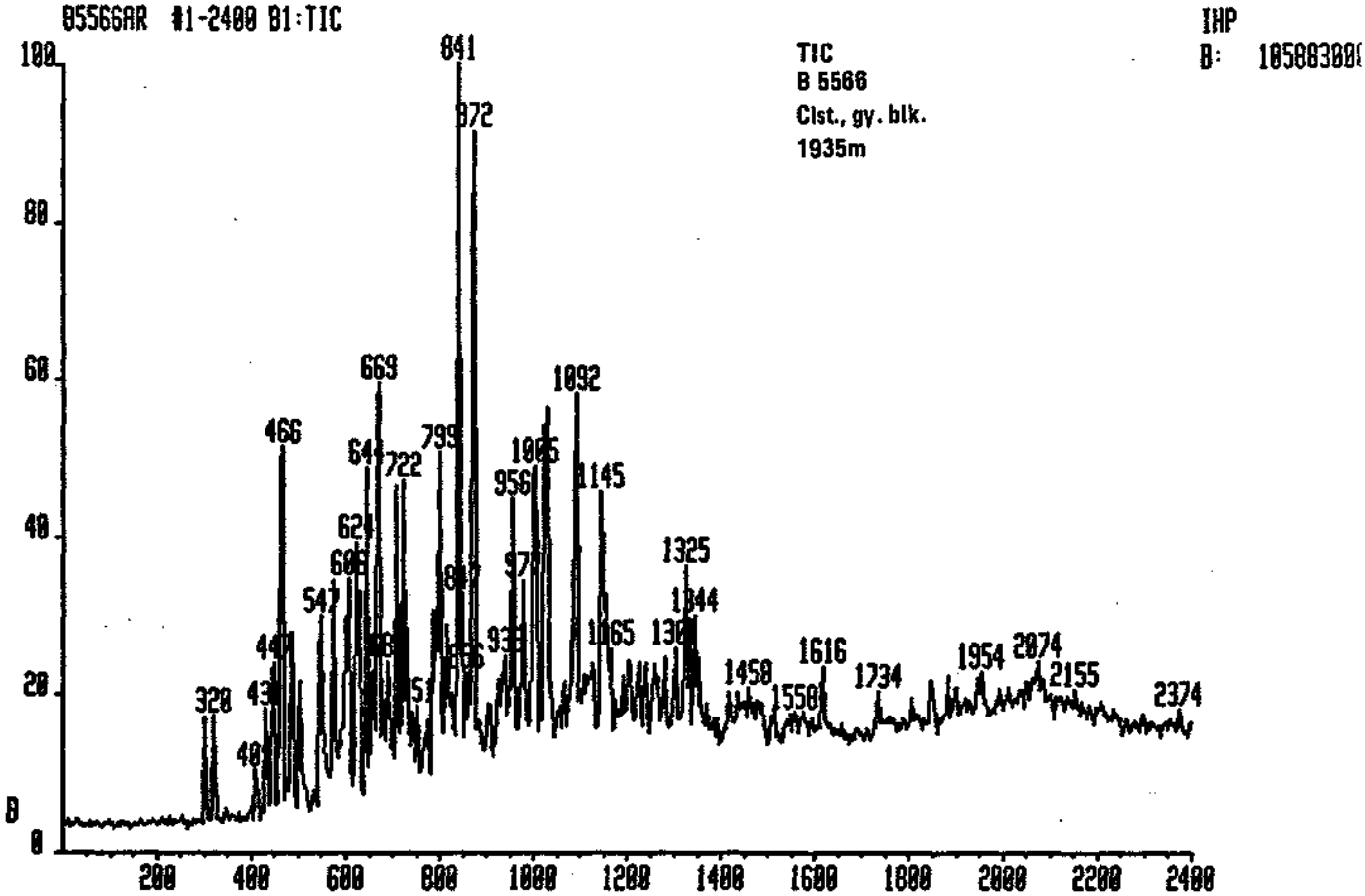
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
IHP
B: 69625497

IKU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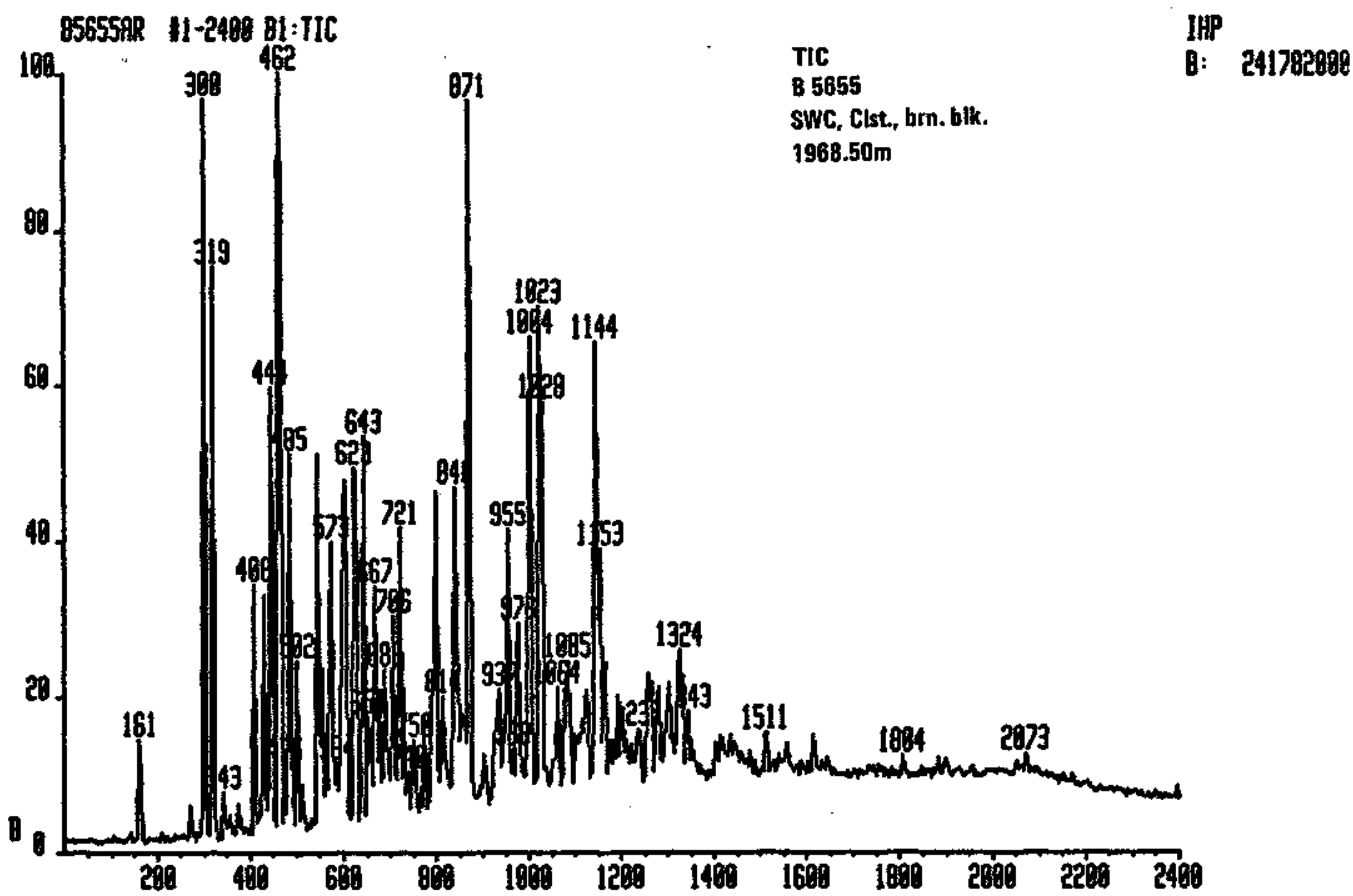
TIC
B 5566
Clst., gy. blk.
1935m
IHP
B: 10508300(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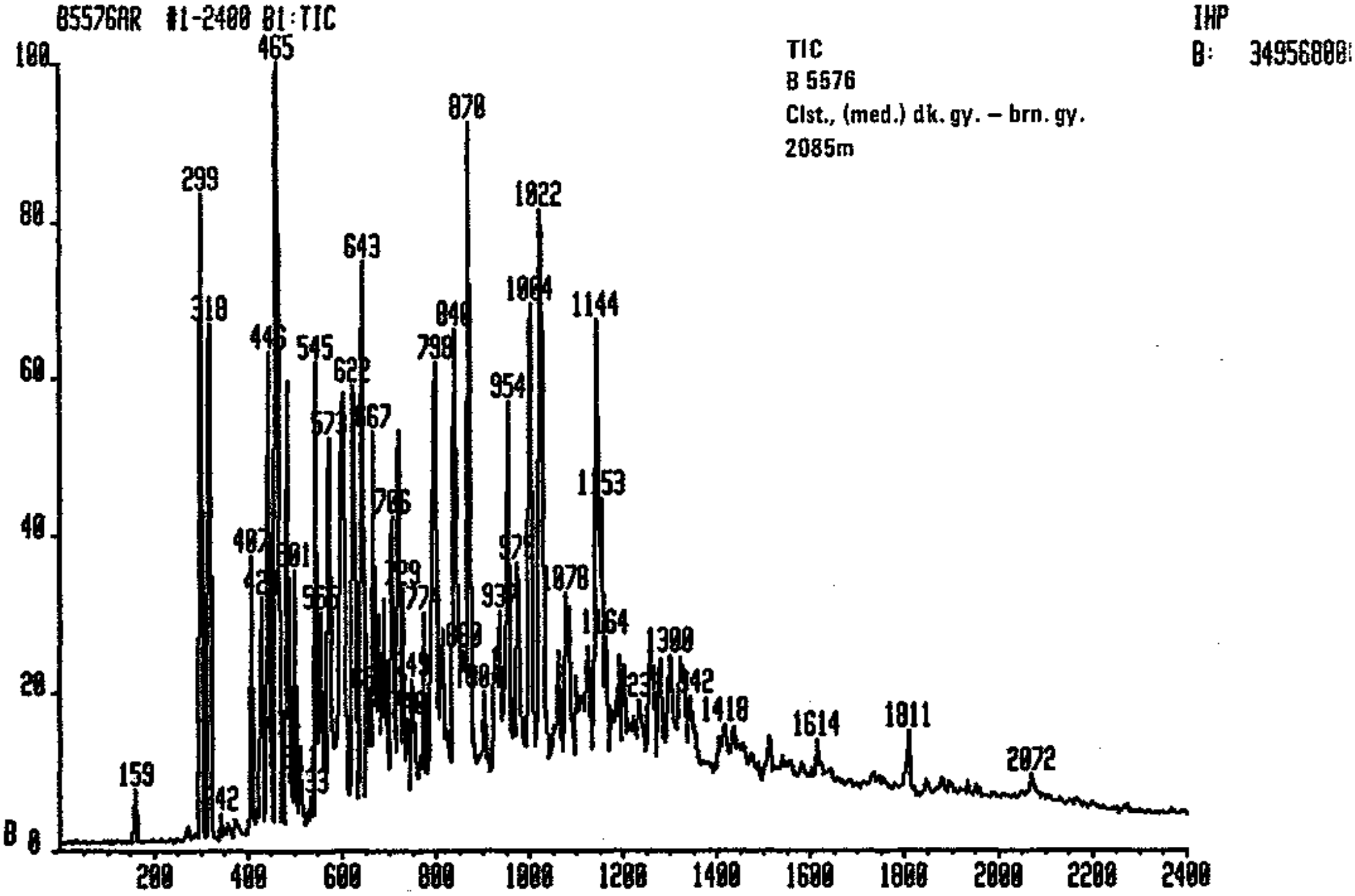
SWC, Clst., brn. blk.
1968.50m
IHP
B: 241702000

IKU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870
299
1022
643
1004
1144
318
446
545
798
622
954
1153
1300
1418
1614
1811
2072
159
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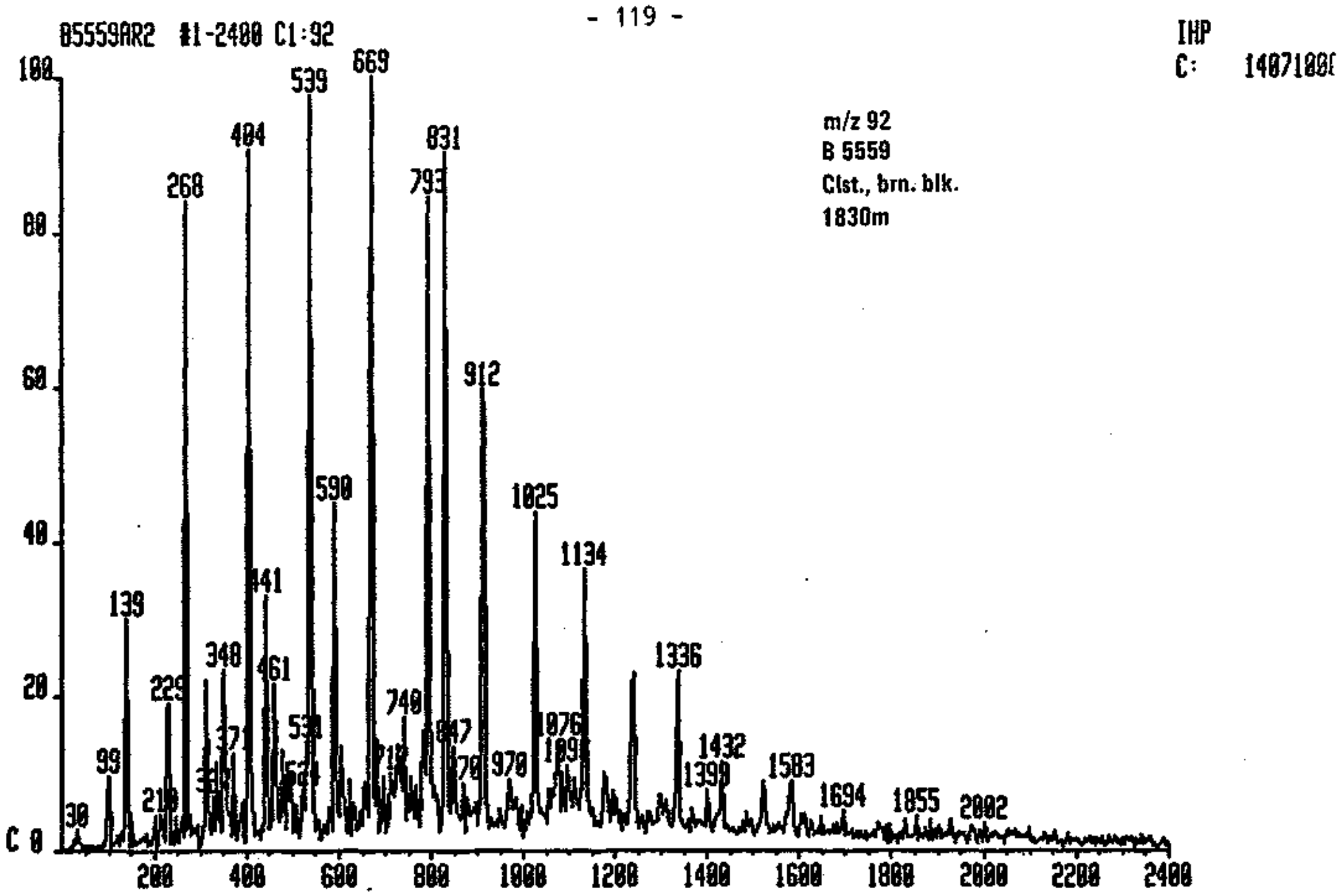
600
800
1000
1200
1400
1600
1800
2000
2200
2400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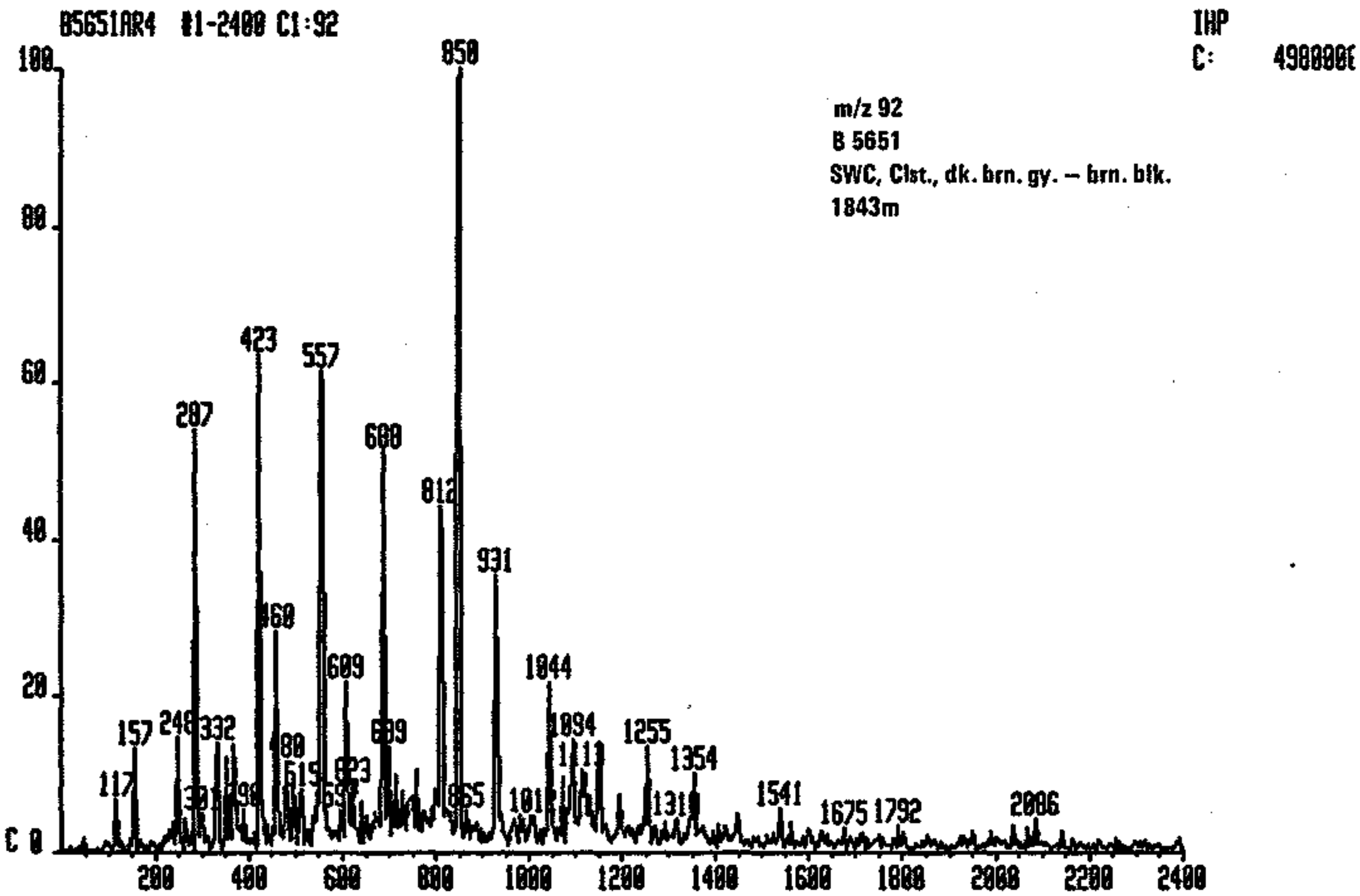
IHP
C: 1407100
m/z 92
B 5559
Clst., brn. blk.
1830m


B5651AR4 #1-2400 C1:92
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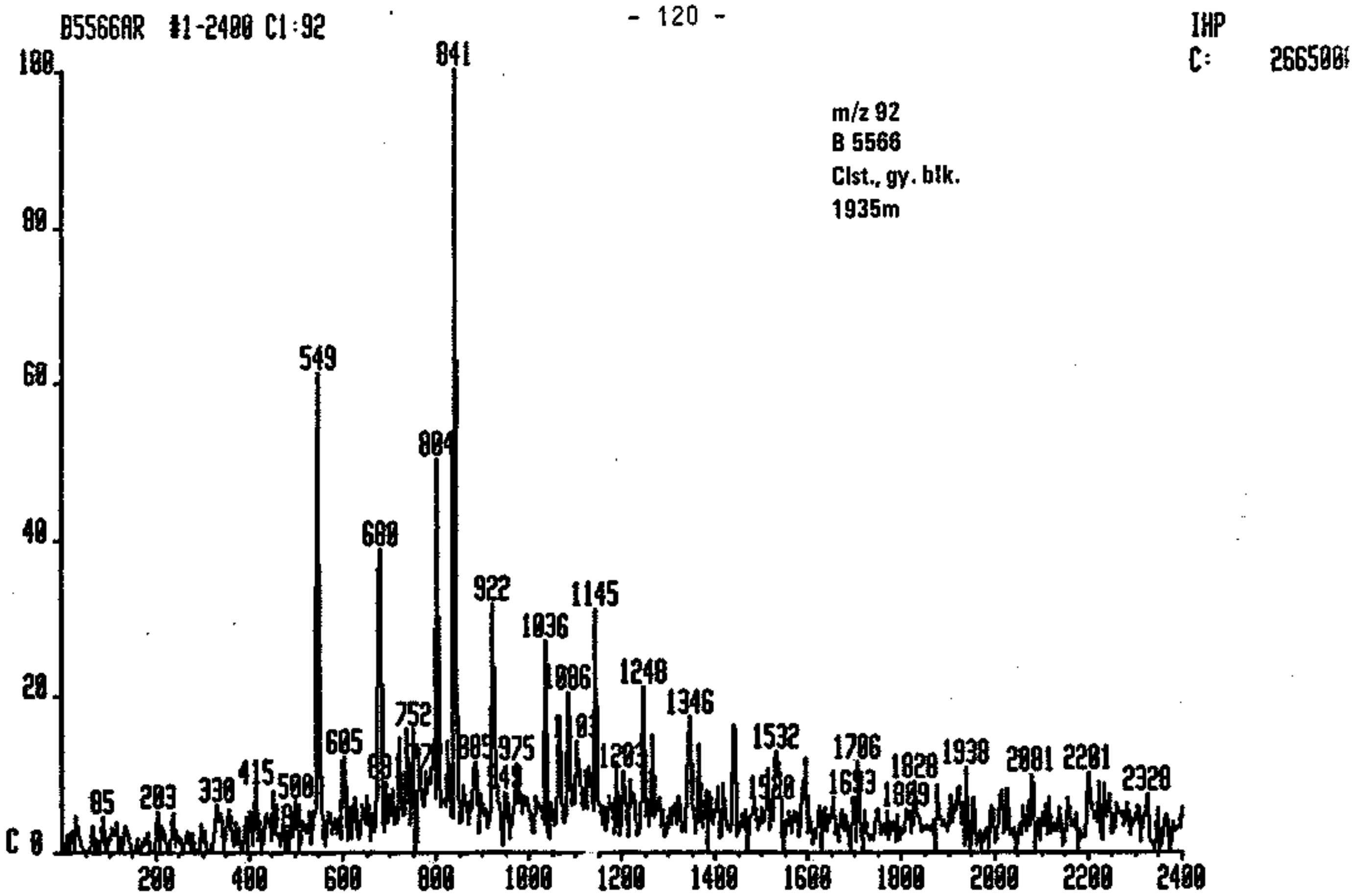
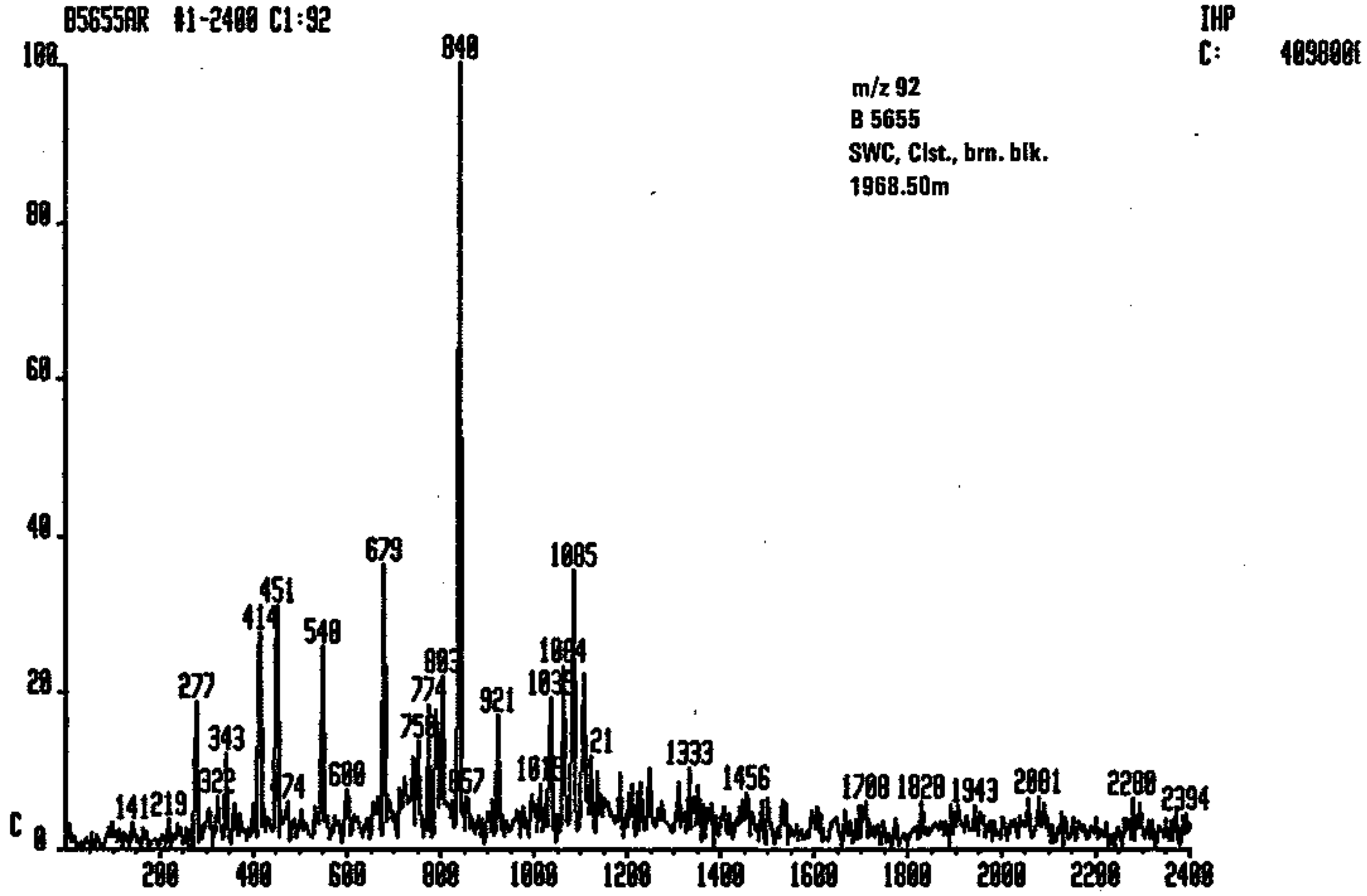
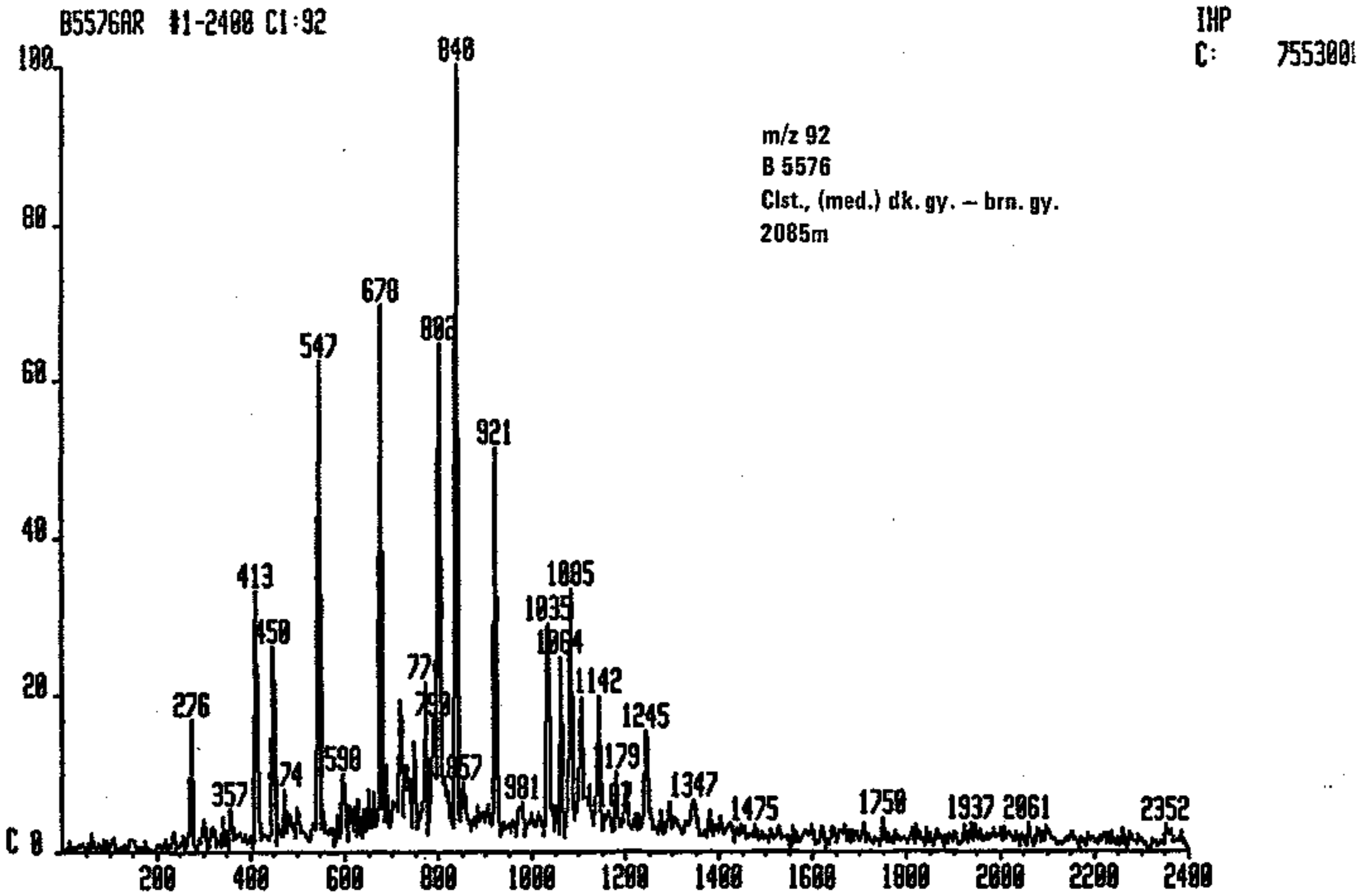
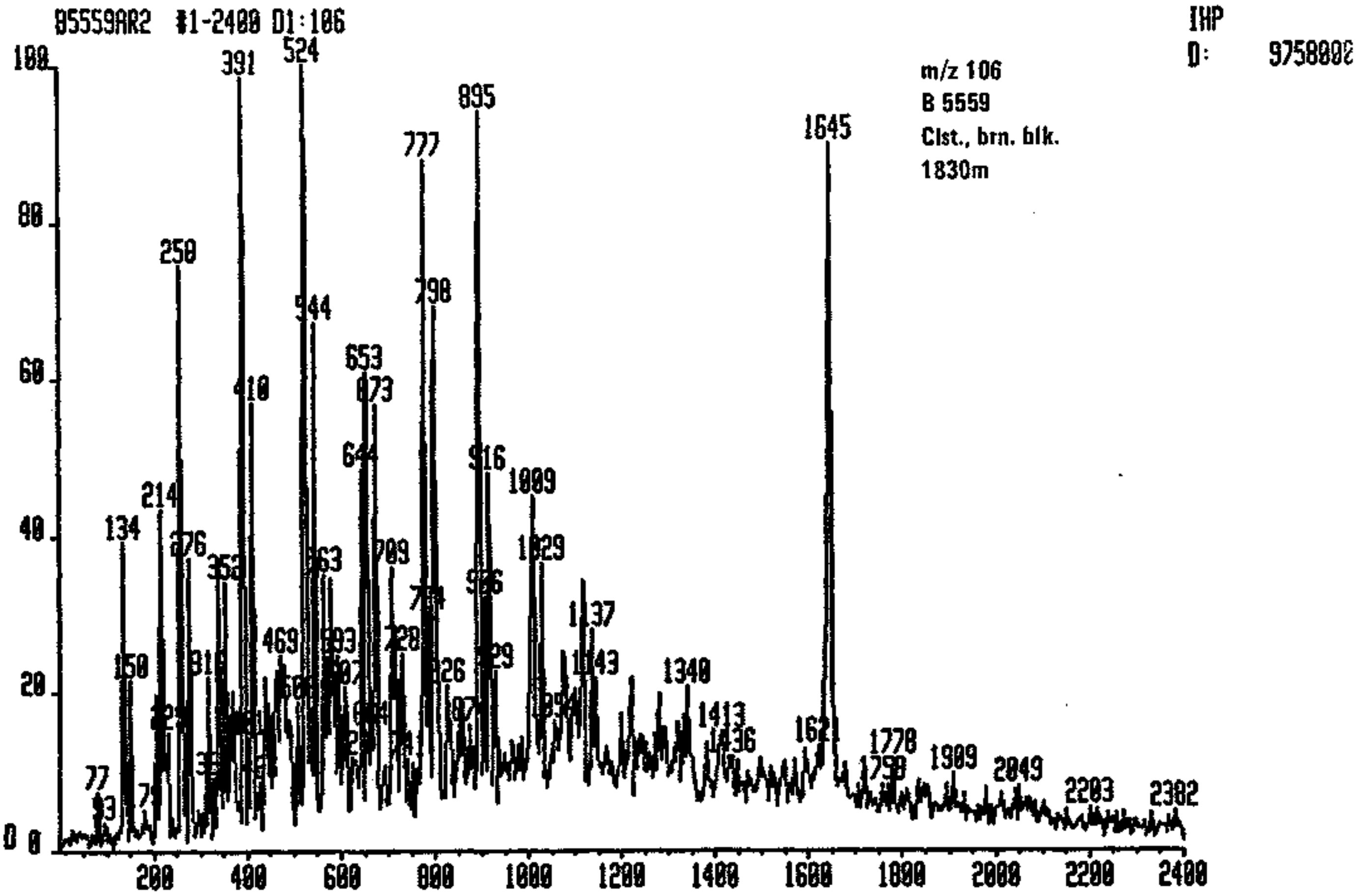
C: 498000
m/z 92
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m

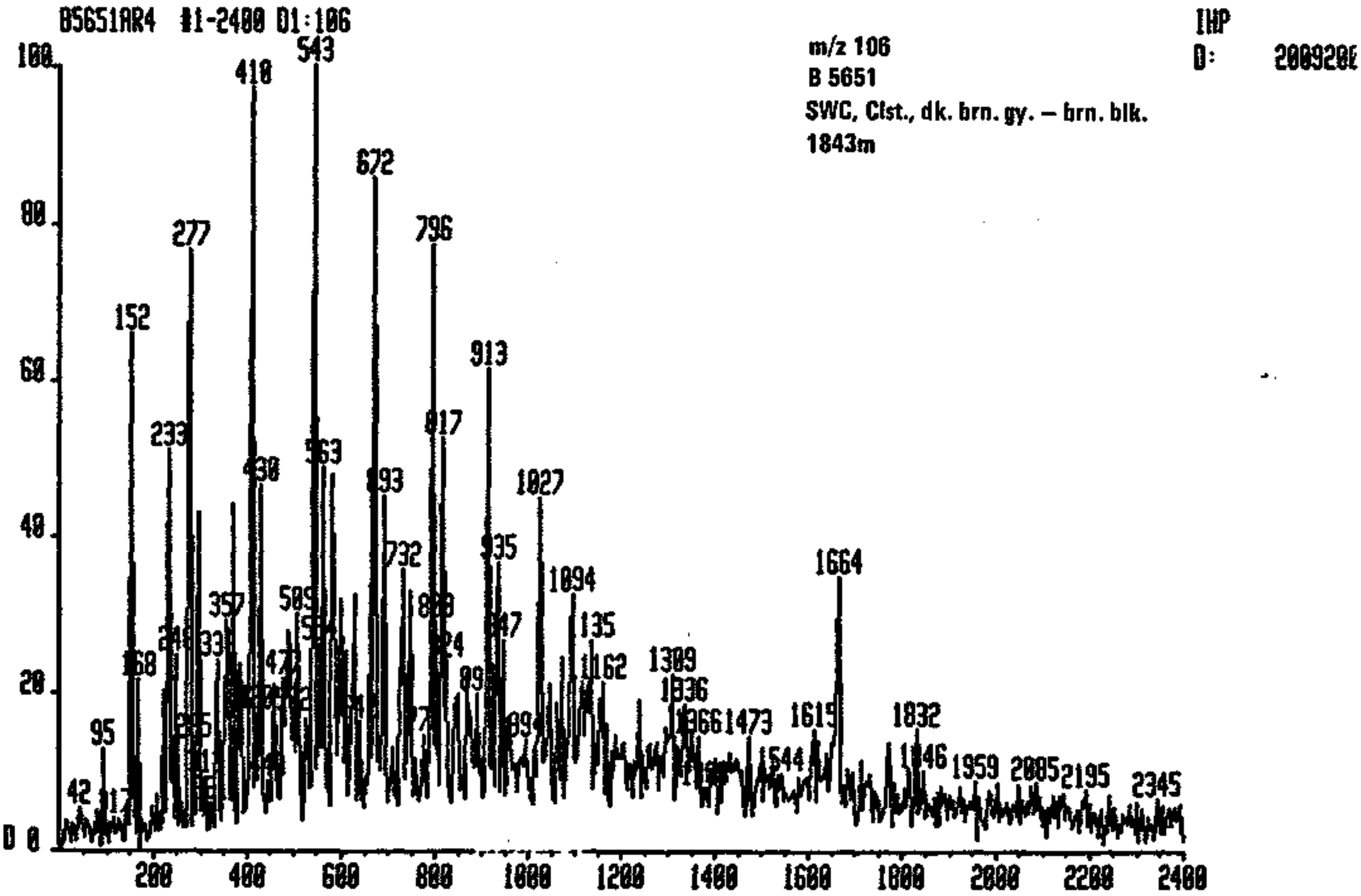

B5566AR #1-2400 C1:92
IHP
C: 266500
m/z 92
B 5566
Clst., gy. blk.
1935m


B5655AR #1-2400 C1:92
IHP
C: 409000
m/z 92
B 5655
SWC, Clst., brn. blk.
1968.50m

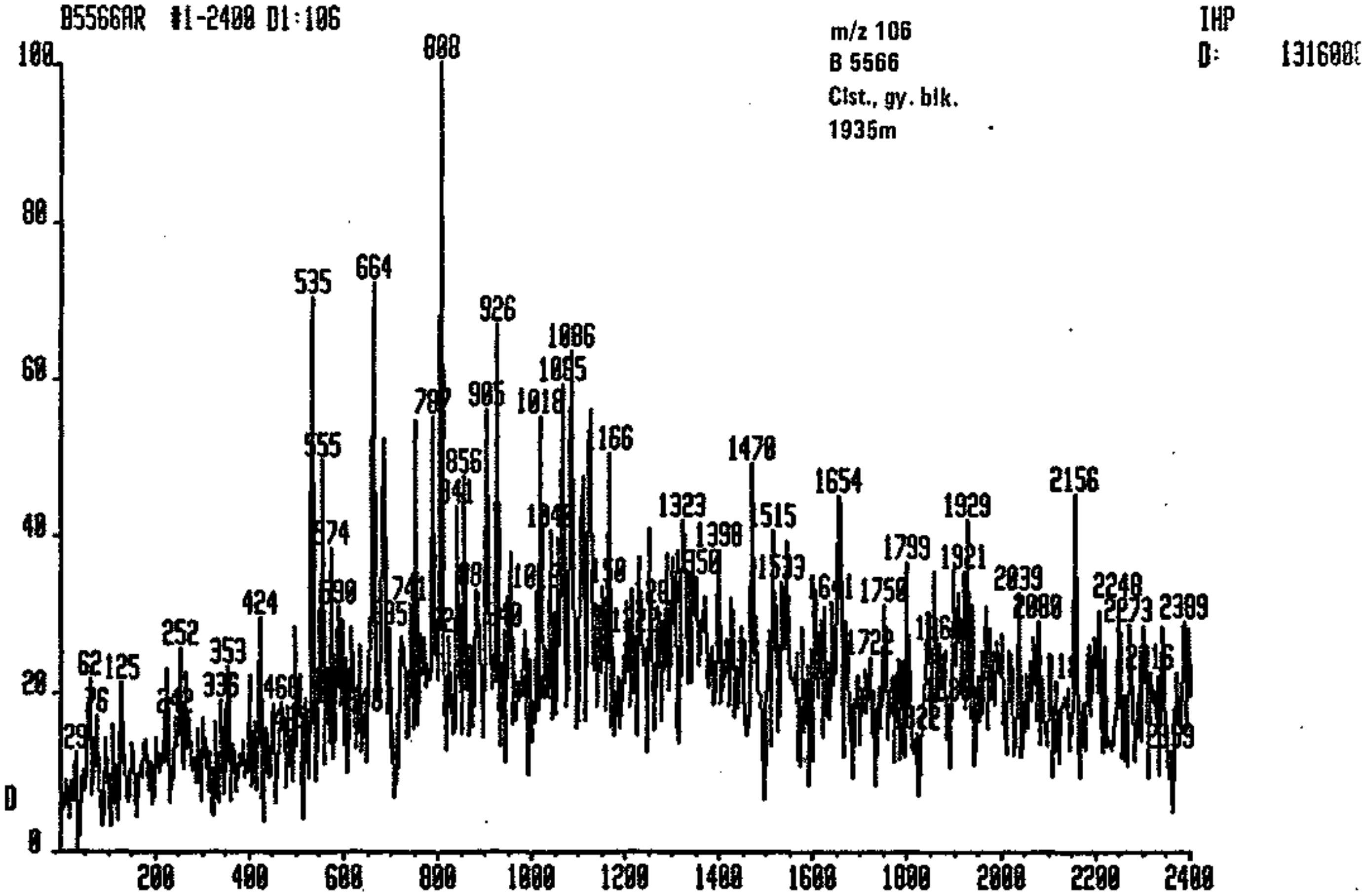

B5576AR #1-2400 CI:92
IHP
C: 7553001
m/z 92
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
840
678
547
802
921
413
1085
1035
450
1064
1142
276
1245
1179
590
357
1347
1475
1750
1937 2061
2352
981
100
80
60
40
20
C 0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400

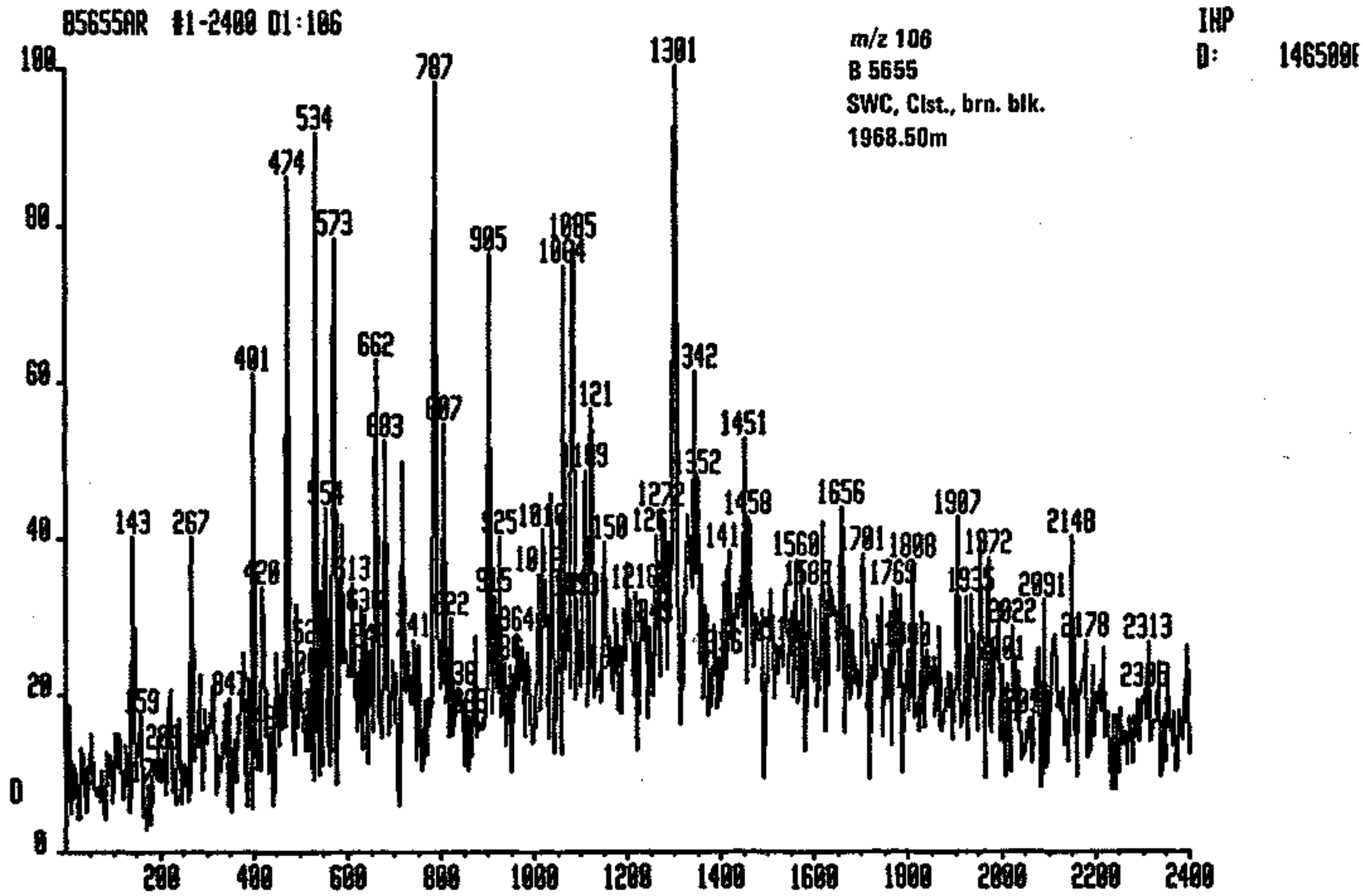
IKU


B5559AR2 #1-2400 D1:106
IHP
D: 9758008
m/z 106
B 5559
Clst., brn. blk.
1830m

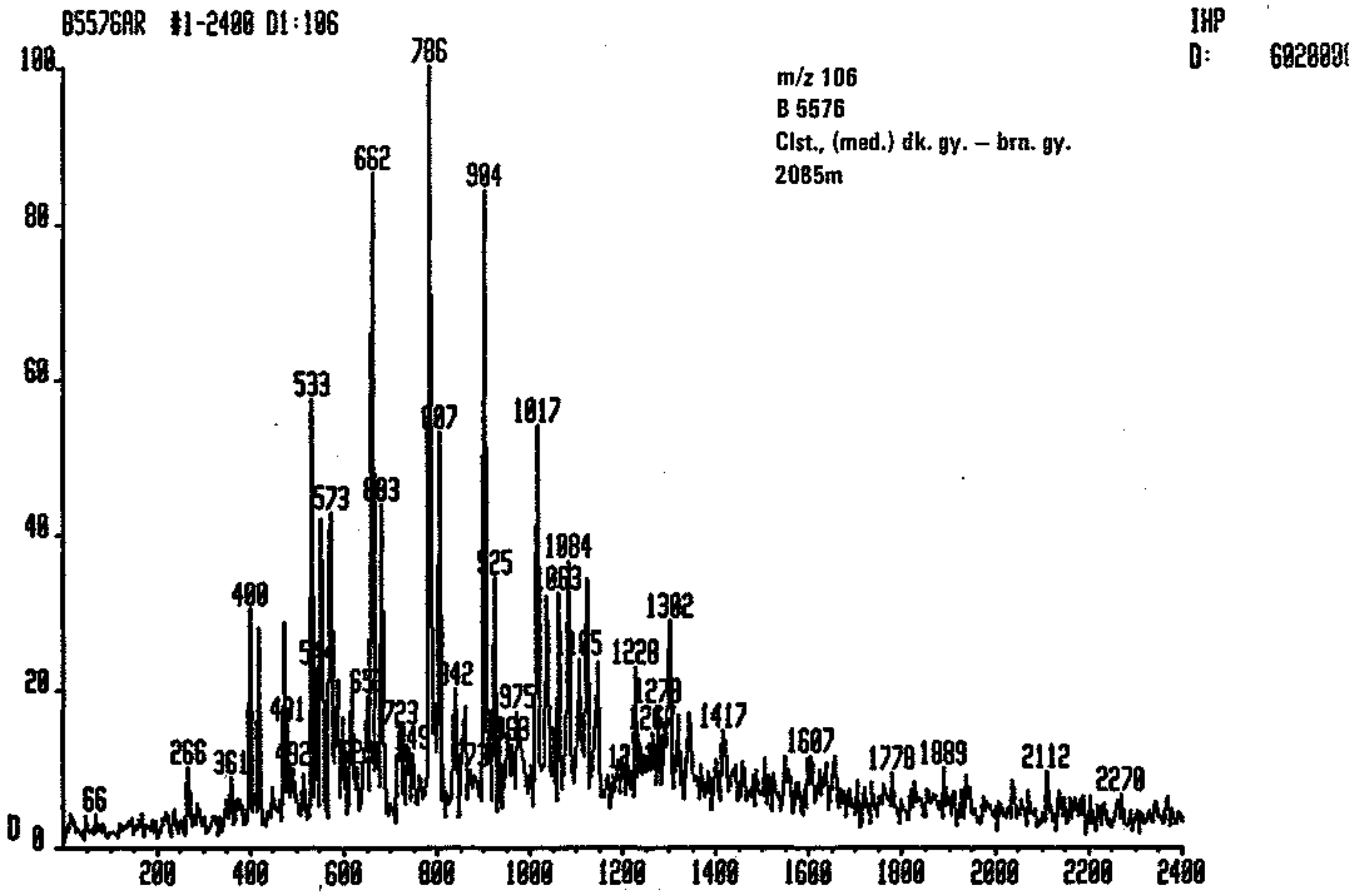

B5651AR4 #1-2400 D1:106
IHP
D: 2009200
m/z 106
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m

IKU

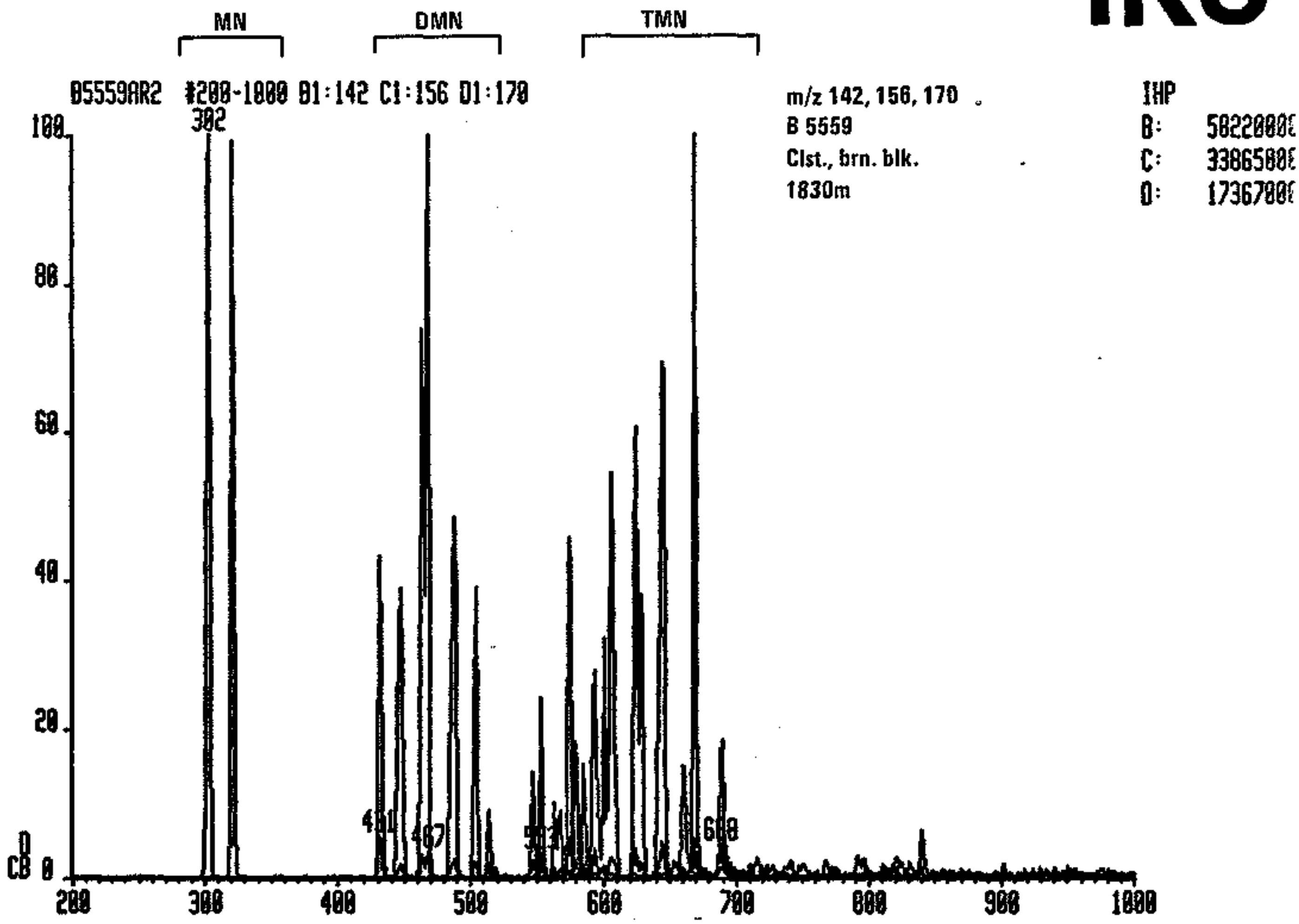

B5566AR #1-2400 D1:106
m/z 106
B 5566
Clst., gy. blk.
1935m
IHP


B5655AR #1-2400 D1:106
m/z 106
B 5655
SWC, Clst., brn. blk.
1968.50m
IHP

IKU


B5576AR #1-2400 DI:106
IHP
D: 6020000
m/z 106
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
786
662
904
533
1017
573
400
1084
1302
1228
1417
1607
1770
1889
2112
2270
266
361
66

IKU


MN
DMN
TMN
B5559AR2 #200-1000 B1:142 C1:156 D1:170
m/z 142, 156, 170
B 5559
Clst., brn. blk.
1830m
IHP
B: 58220000
C: 33865000
D: 17367000
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100
80
60
40
20
0
200
300
400
500
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700
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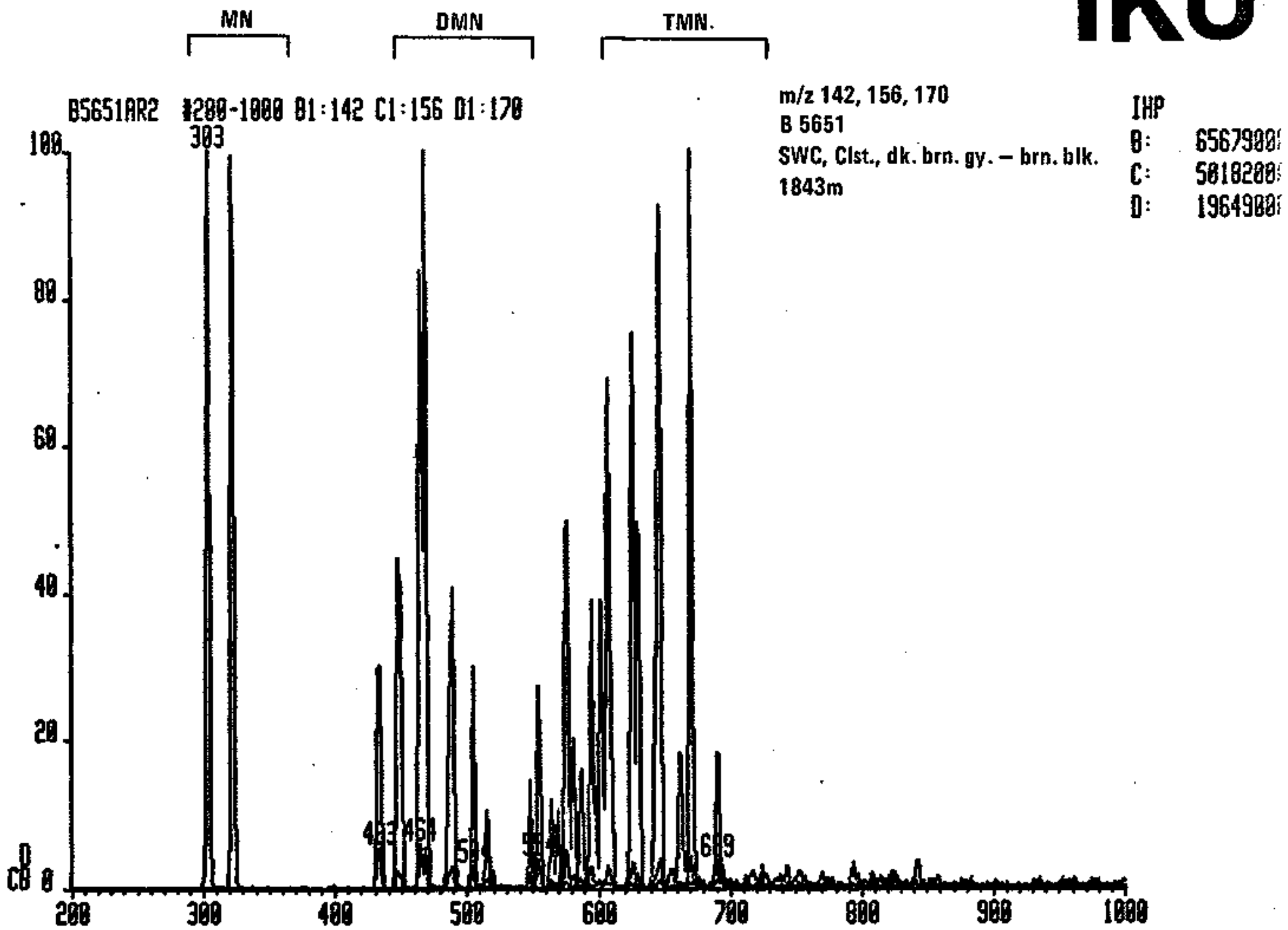
900
1000

IKU


MN
DMN
TMN.
B5651AR2 #200-1000 B1:142 C1:156 D1:170
m/z 142, 156, 170
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
IHP
B: 6567900
C: 5018200
D: 1964900
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80
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0
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400
500
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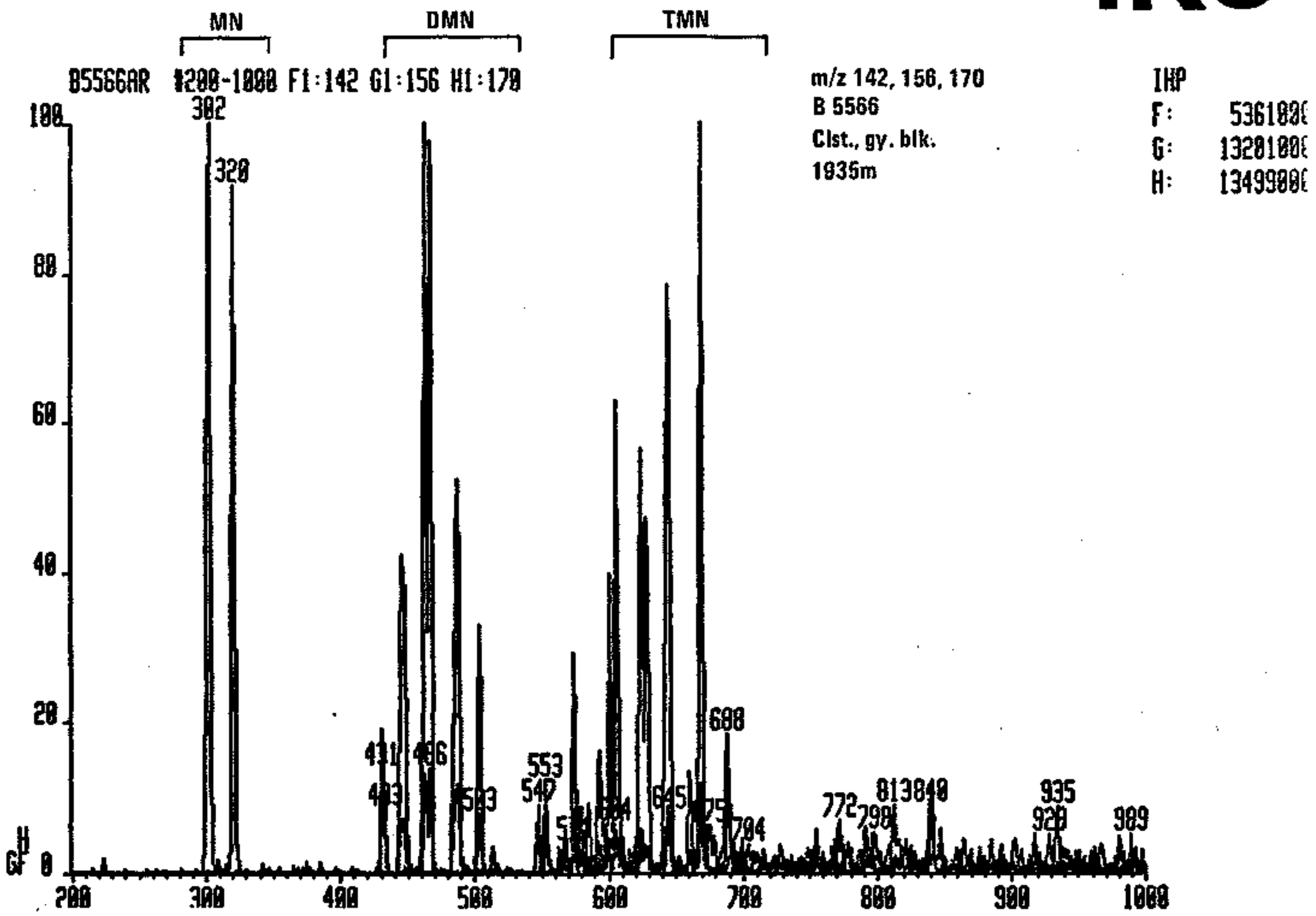
1000

IKU


MN
DMN
TMN
B5566AR #200-1000 F1:142 G1:156 H1:170
m/z 142, 156, 170
B 5566
Clst., gy. blk.
1935m
IHP
F: 5361000
G: 1320100
H: 1349900
302
320
431
456
553
547
403
503
645
688
772
798
813
840
935
920
989
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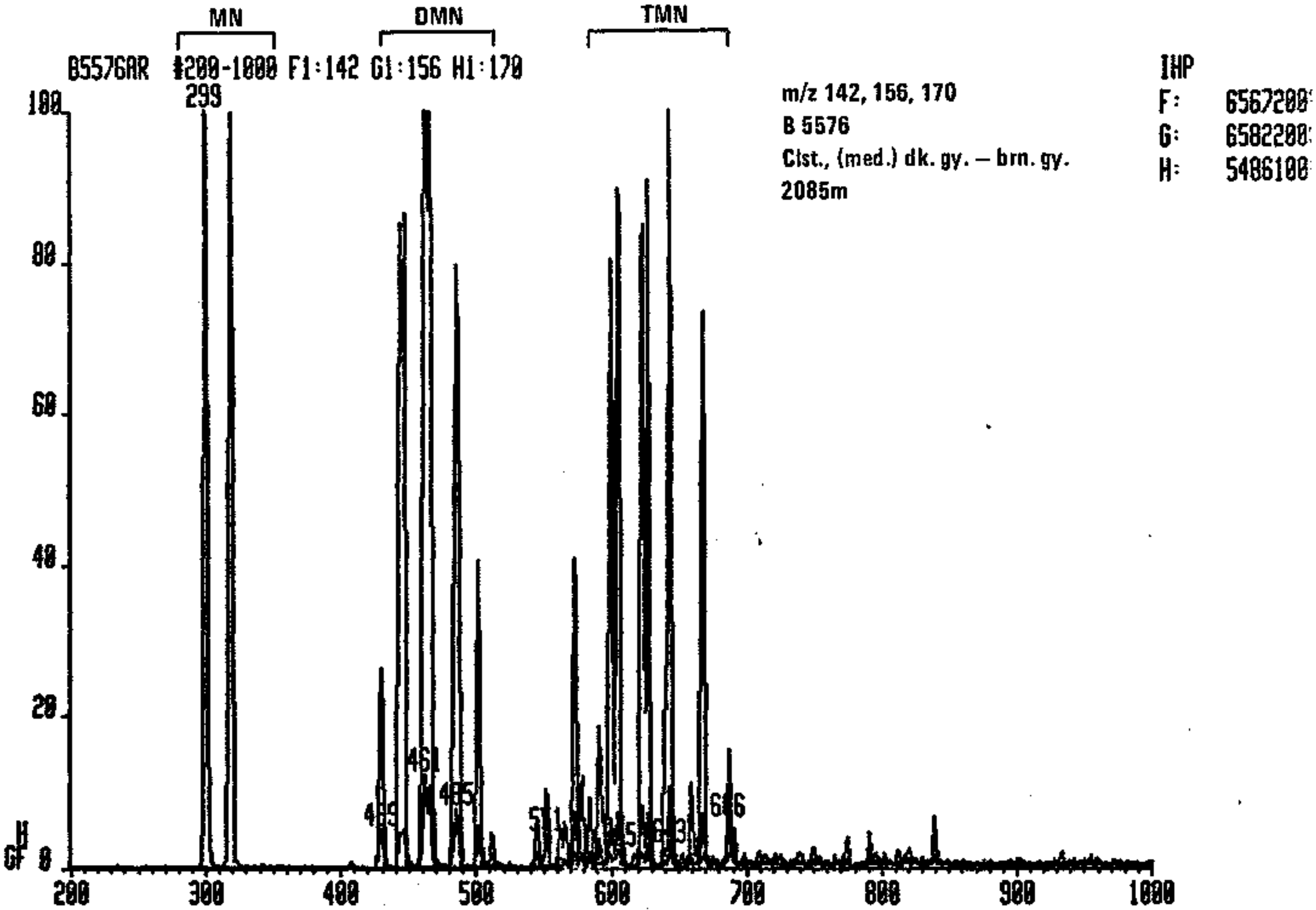
1000

IKU


MN
DMN
TMN
B5576AR #200-1000 F1:142 G1:156 H1:170
299
m/z 142, 156, 170
B 5576
Cist., (med.) dk. gy. – brn. gy.
2085m
IHP
F: 6567200
G: 6582200
H: 5486100
100
80
60
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20
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300
400
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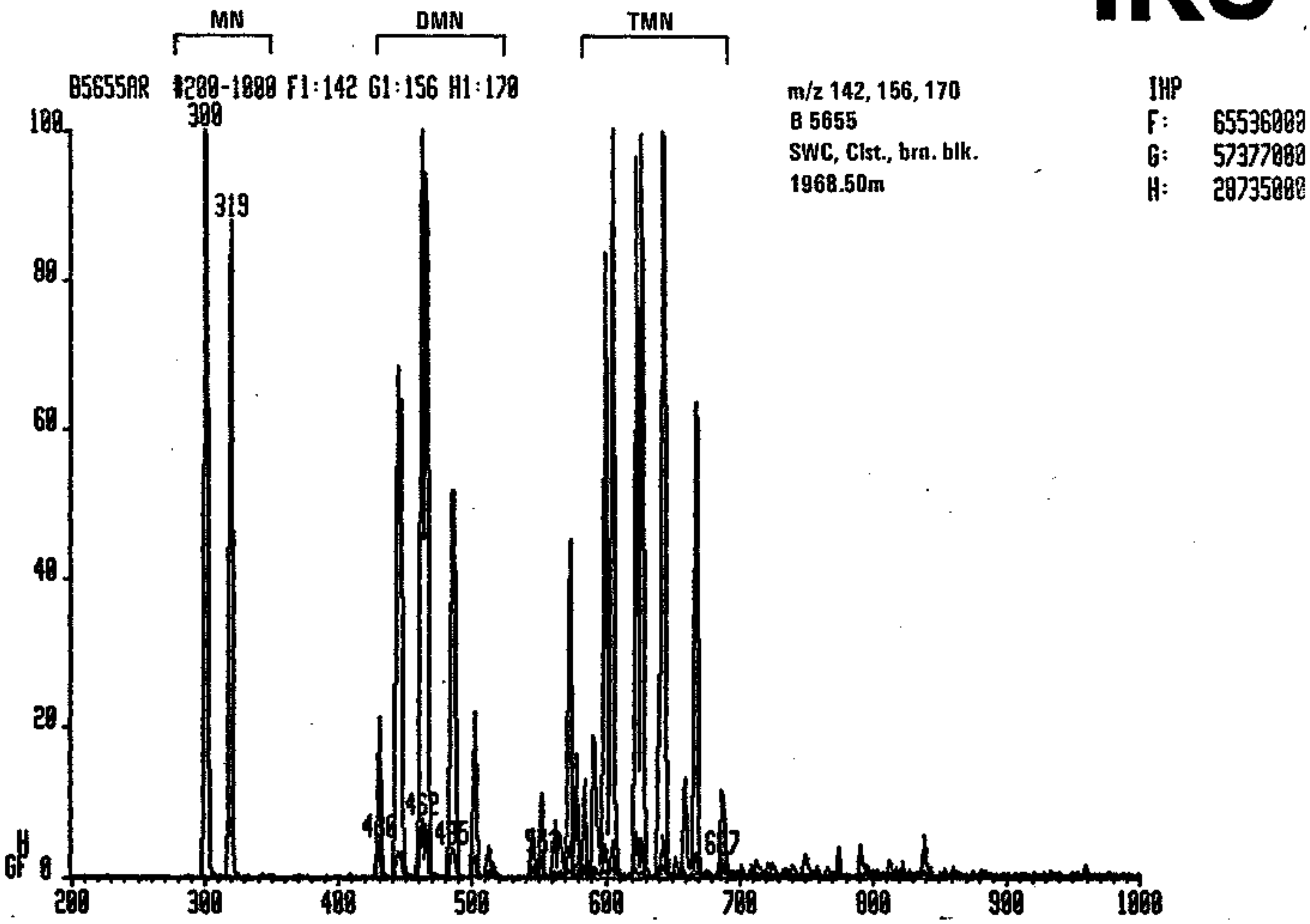
900
1000

IKU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DMN
TMN
B5655AR #200-1000 F1:142 G1:156 H1:170
m/z 142, 156, 170
B 5655
SWC, Cist., brn. blk.
1968.50m
IHP
F: 65536000
G: 57377000
H: 20735000
300
319
430
462
485
687
100
80
60
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20
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400
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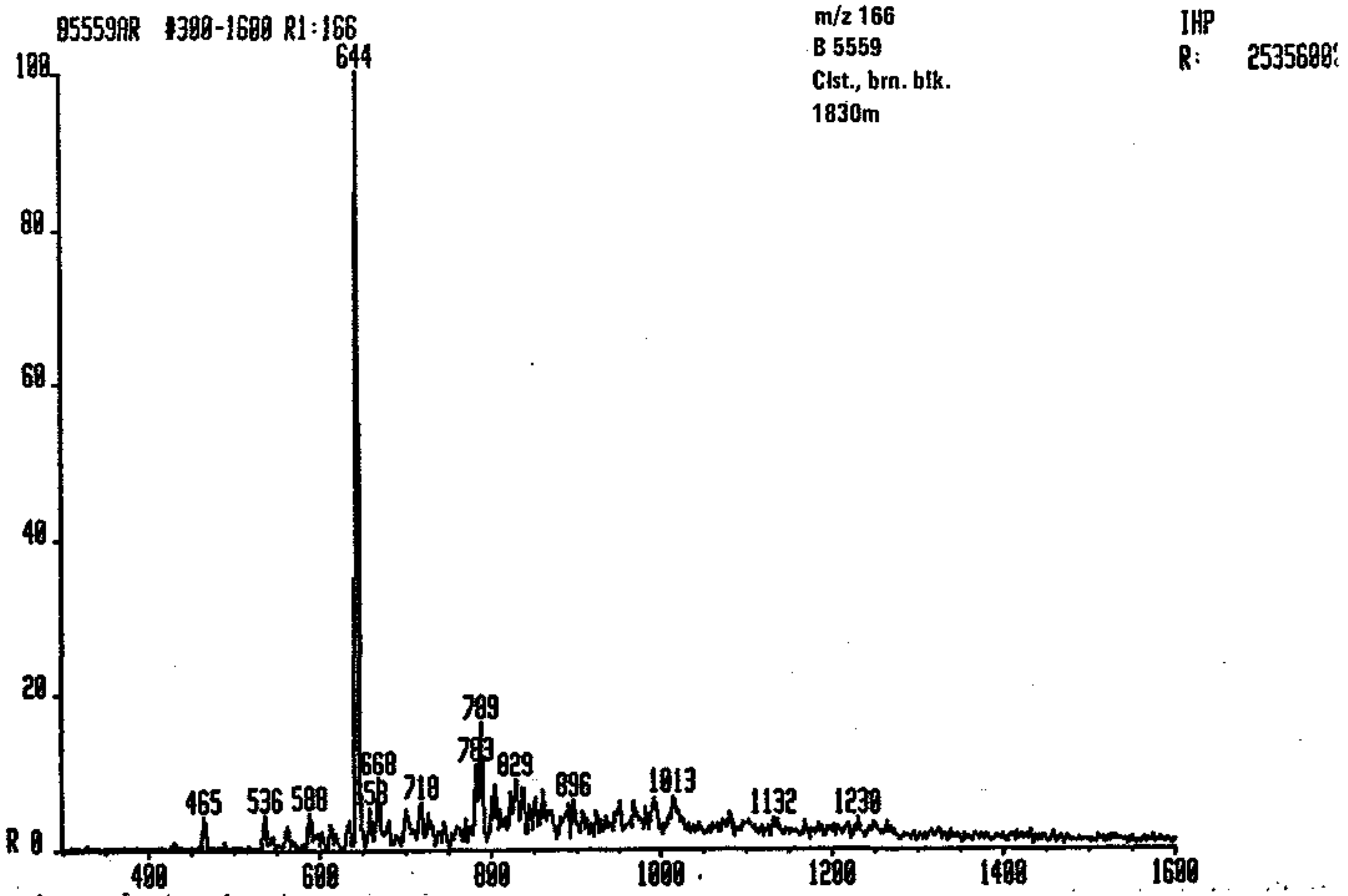
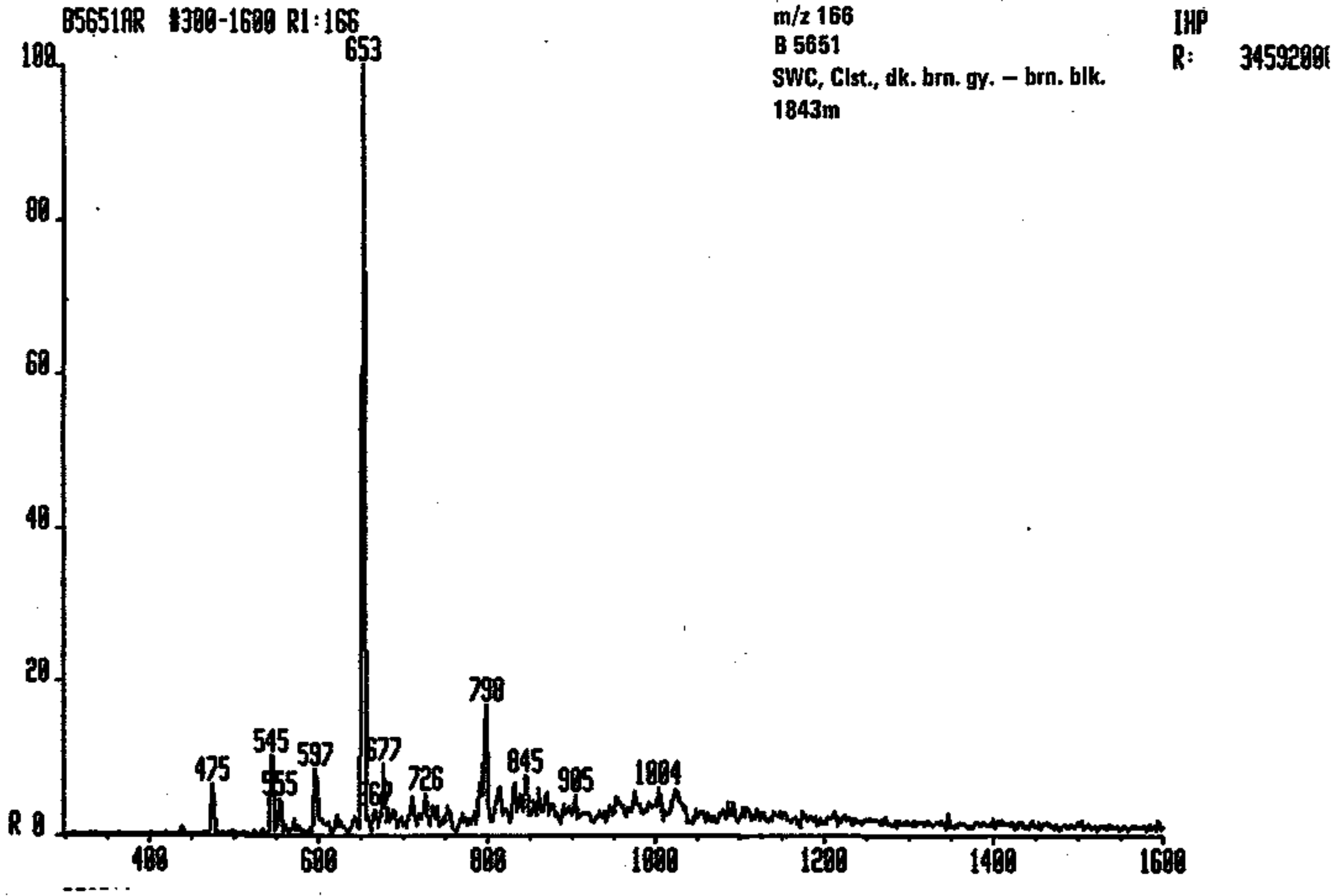
800
900
1000

IKU


B5559AR #300-1600 R1:166
m/z 166
B 5559
Clst., brn. blk.
1830m
IHP
R: 2535600
644
789
783
829
668
658
710
896
1013
1132
1230
465
536
580
100
80
60
40
20
R 0
400
600
800
1000
1200
1400
1600


B5651AR #300-1600 R1:166
m/z 166
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
IHP
R: 3459200
653
798
545
597
677
475
555
726
845
905
1004
100
80
60
40
20
R 0
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600
800
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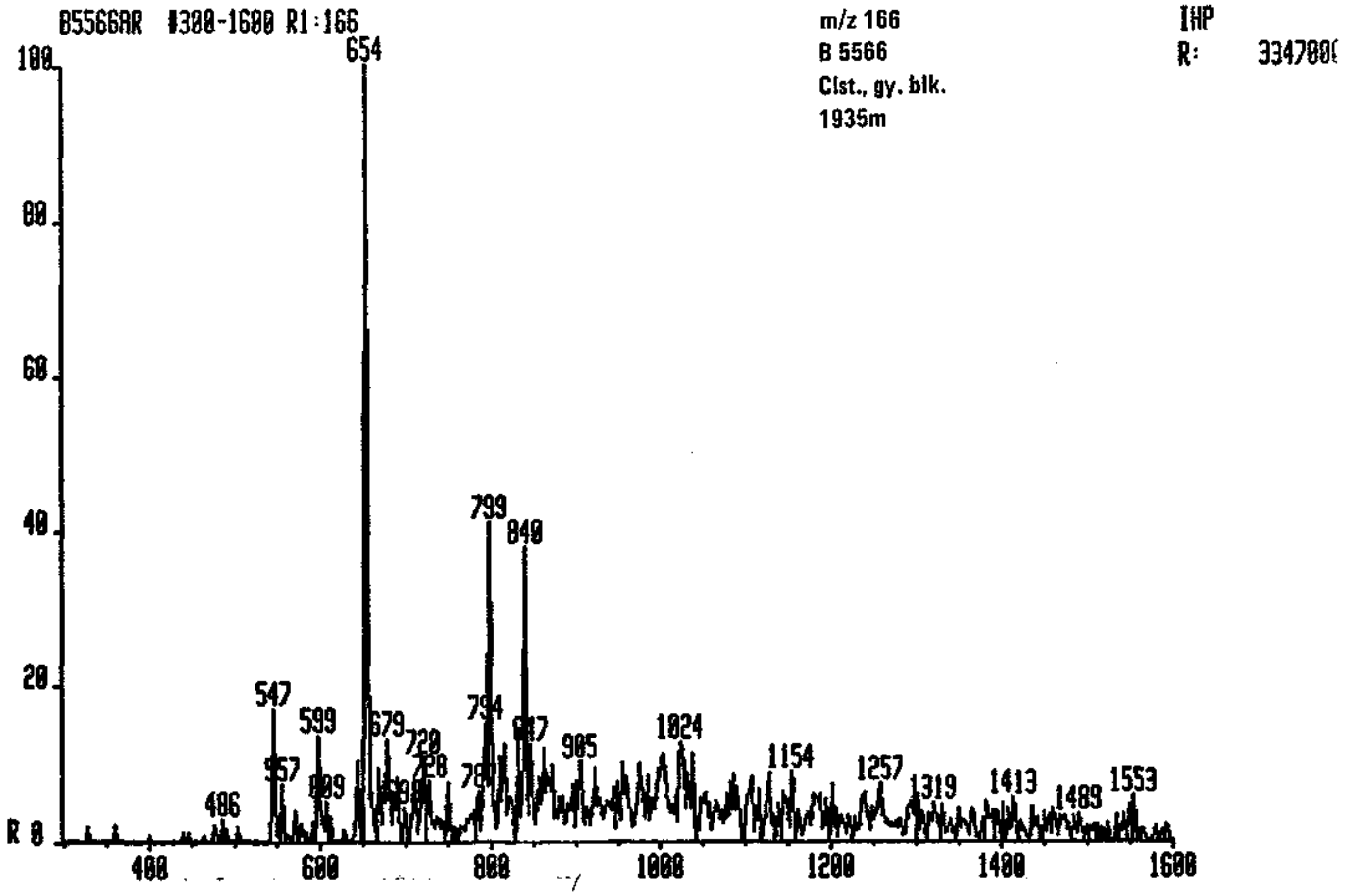
1200
1400
1600

IKU


B5566AR #300-1600 R1:166
m/z 166
B 5566
Clst., gy. blk.
1935m
IHP
R: 3347800
654
799
840
547
599
679
720
728
794
847
905
1024
1154
1257
1319
1413
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557
609
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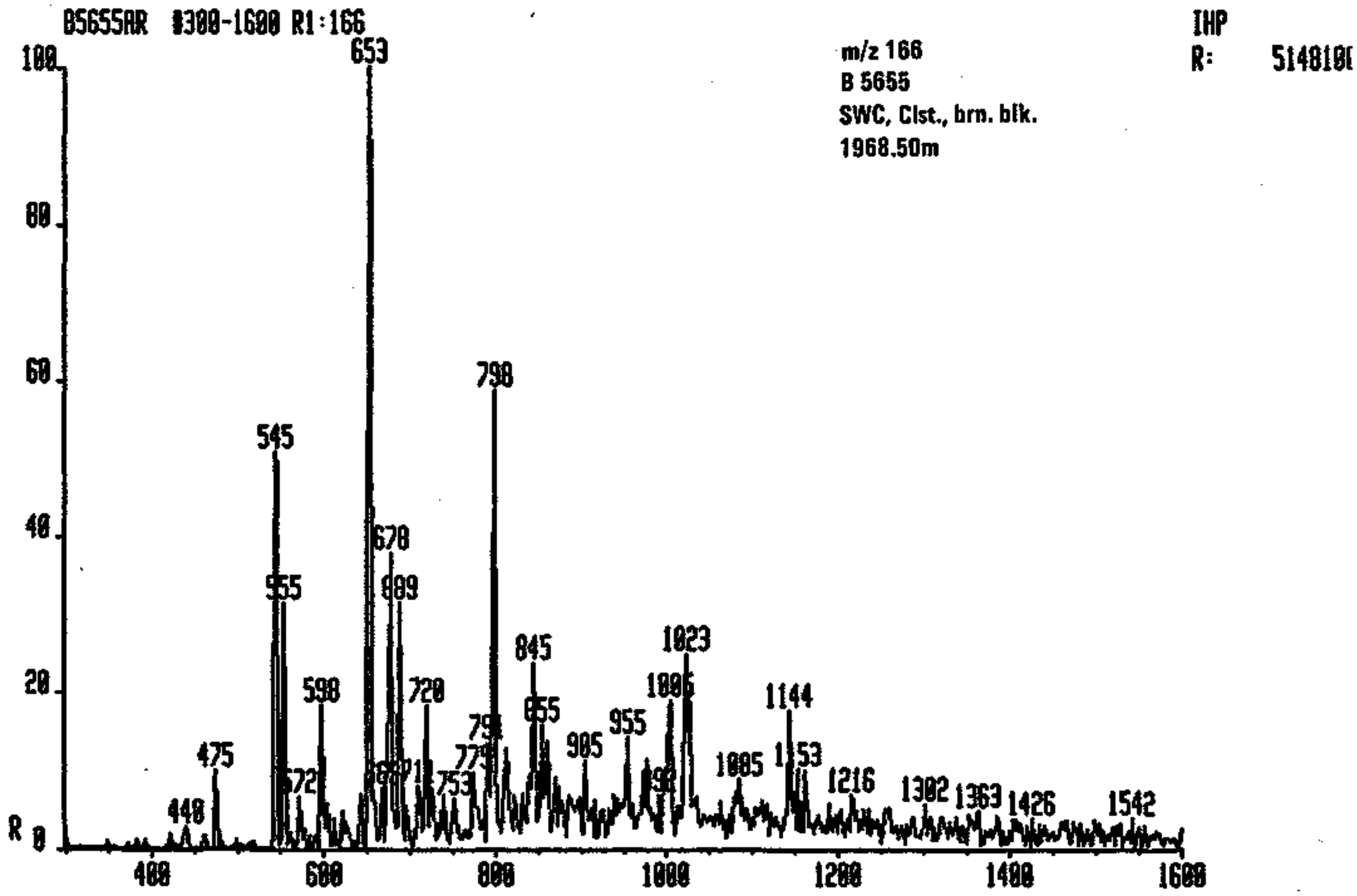
B5655AR #300-1600 R1:166
m/z 166
B 5655
SWC, Clst., brn. blk.
1968.50m
IHP
R: 5148100
653
798
545
678
555
689
845
1023
598
720
1006
1144
475
794
855
905
955
779
753
572
1085
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1302
1363
1426
1542
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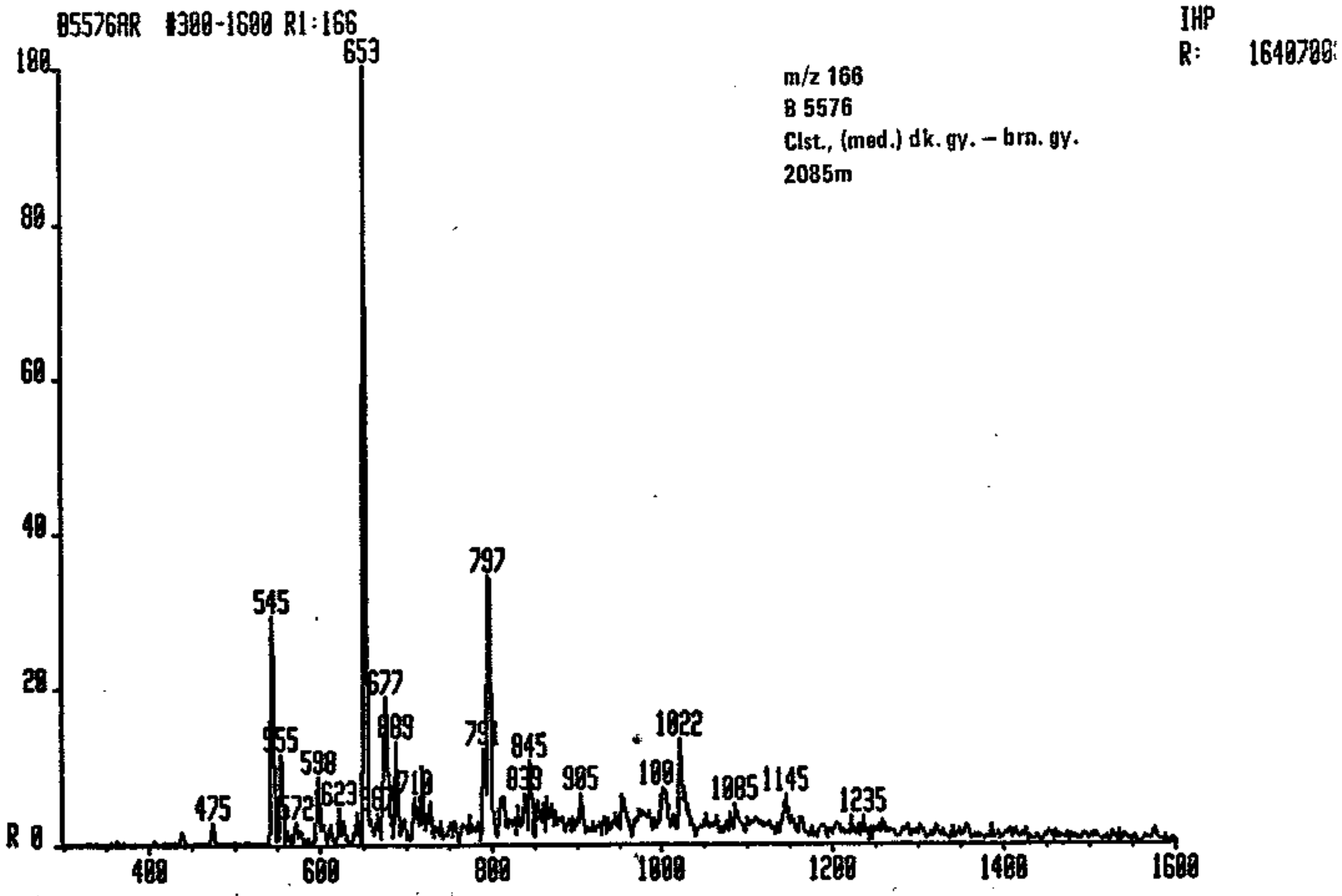
1400
1600

IKU


B5576AR #300-1600 RI:166
IHP
R: 1640700
m/z 166
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
100
80
60
40
20
R 0
653
797
545
677
1022
845
905
1145
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598
623
475
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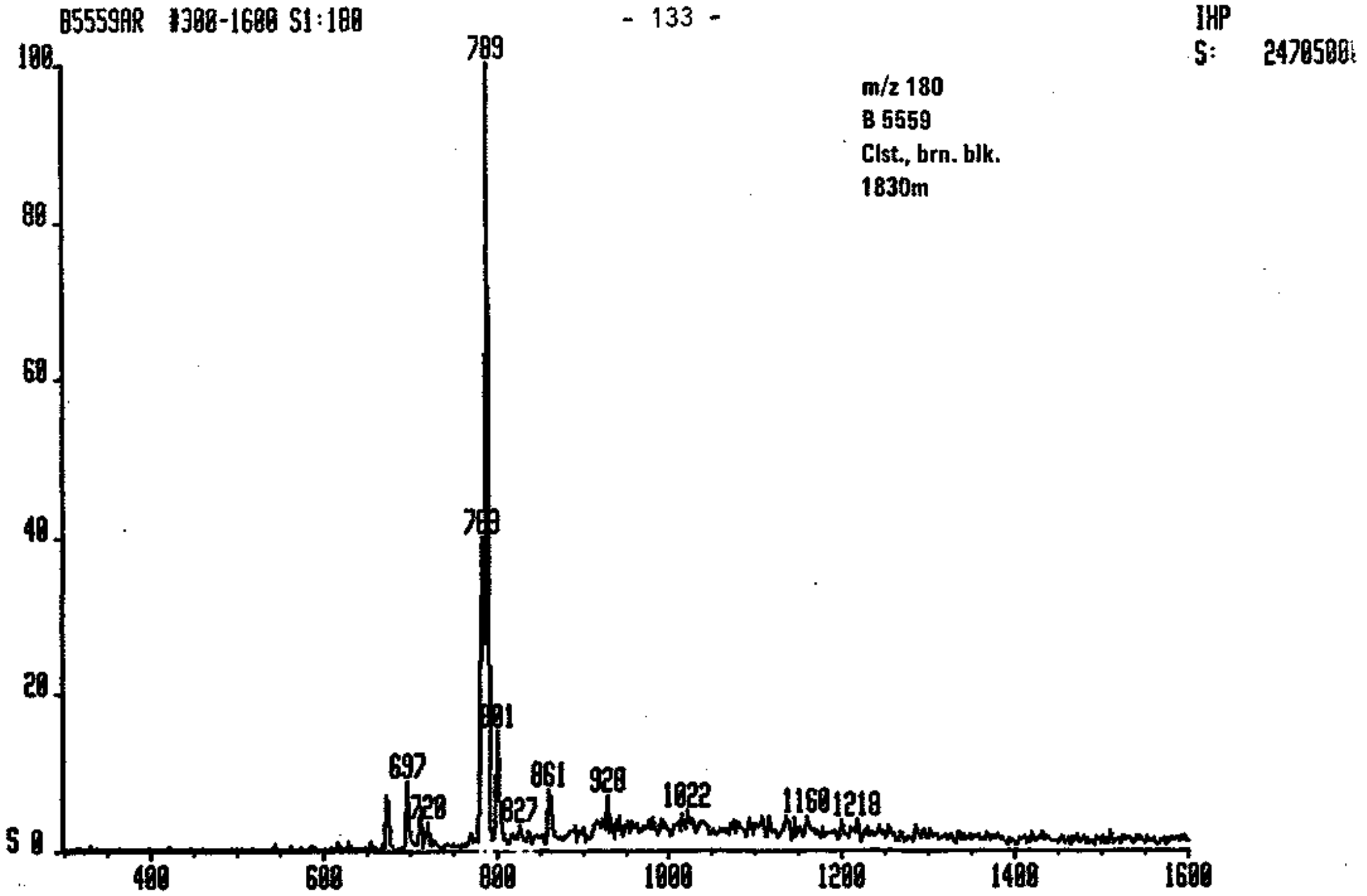
1400
1600


B5559AR #300-1600 S1:100
IHP
S: 2470500
m/z 180
B 5559
Clst., brn. blk.
1830m
789
788
801
697
720
827
861
928
1022
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1218
100
80
60
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20
S 0
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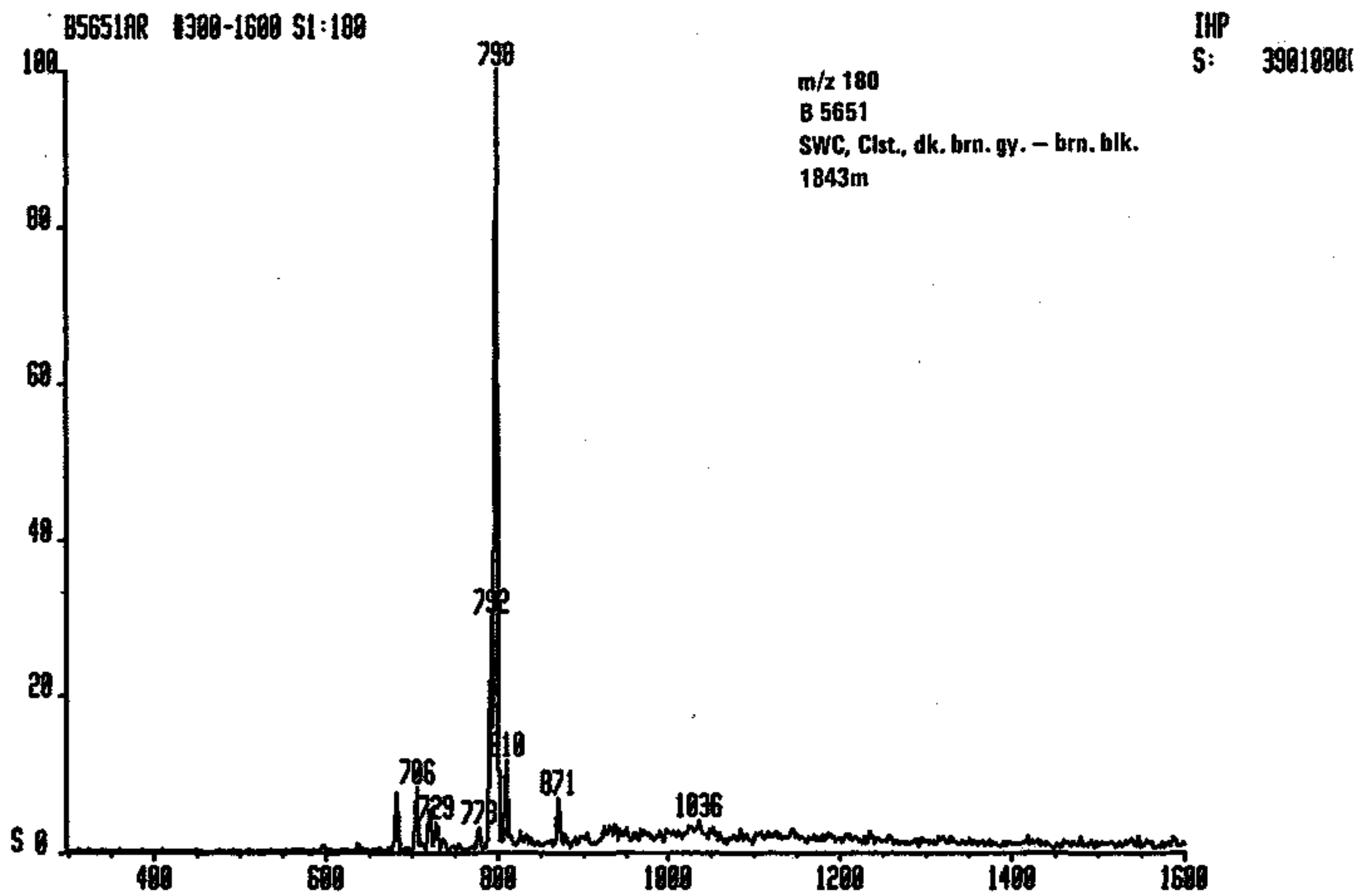
1200
1400
1600


B5651AR #300-1600 S1:100
IHP
S: 3901000
m/z 180
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
798
792
810
706
729
778
871
1036
100
80
60
40
20
S 0
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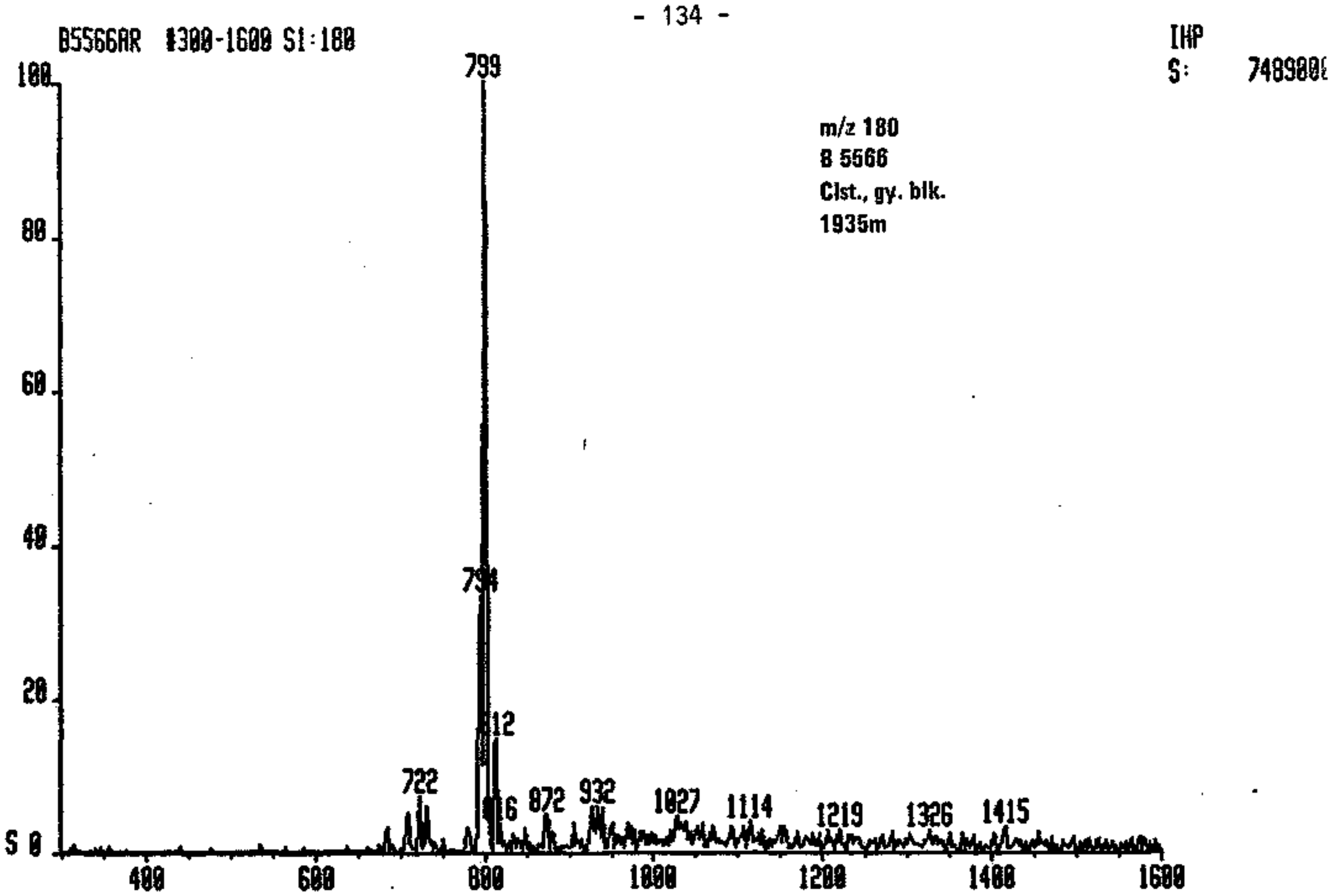
600
800
1000
1200
1400
1600


B5566AR #300-1600 S1:100
IHP
S: 7409000
m/z 180
B 5566
Clst., gy. blk.
1935m
799
794
812
722
816
872
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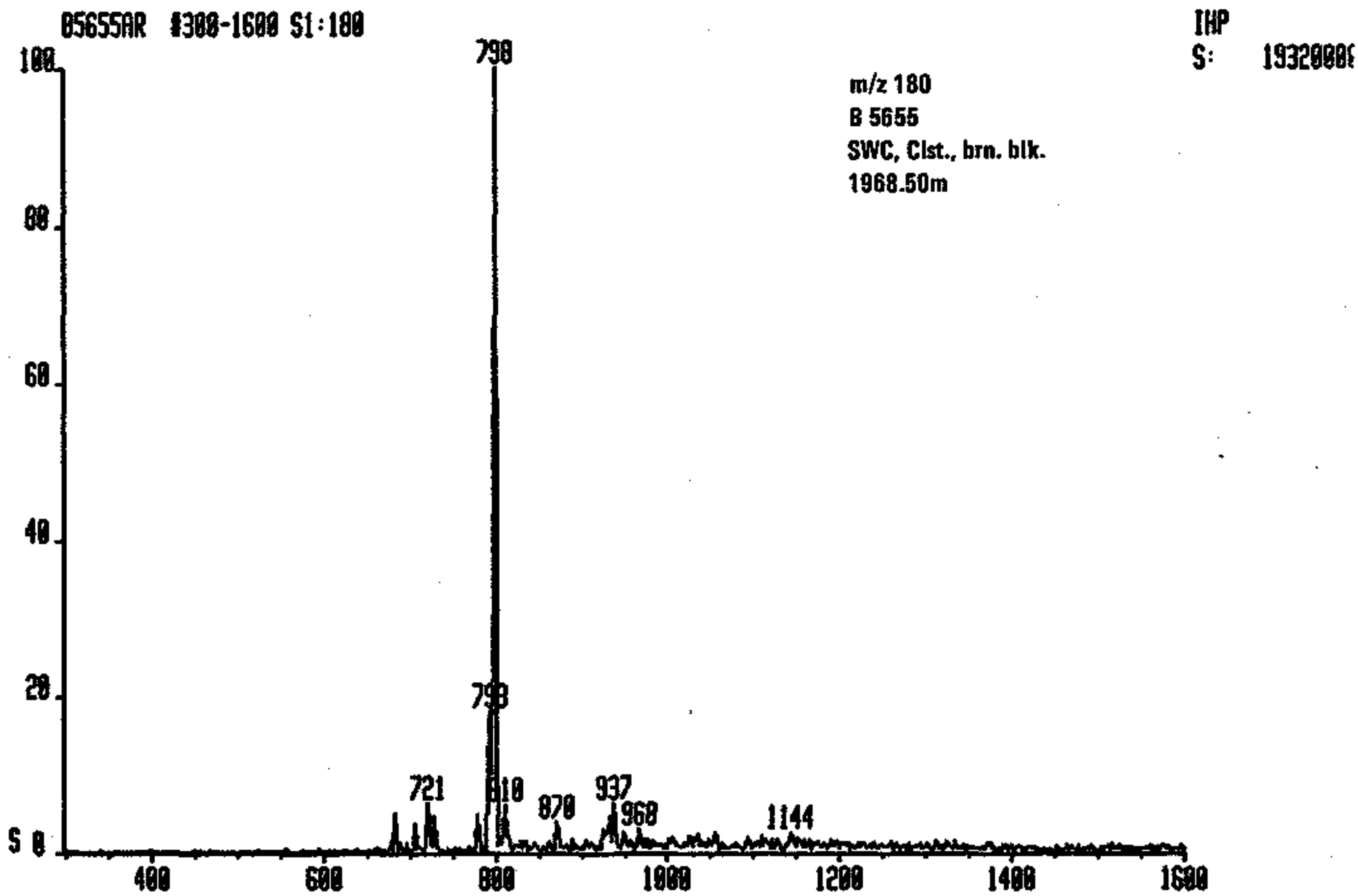
1600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IHP
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m/z 180
B 5655
SWC, Clst., brn. blk.
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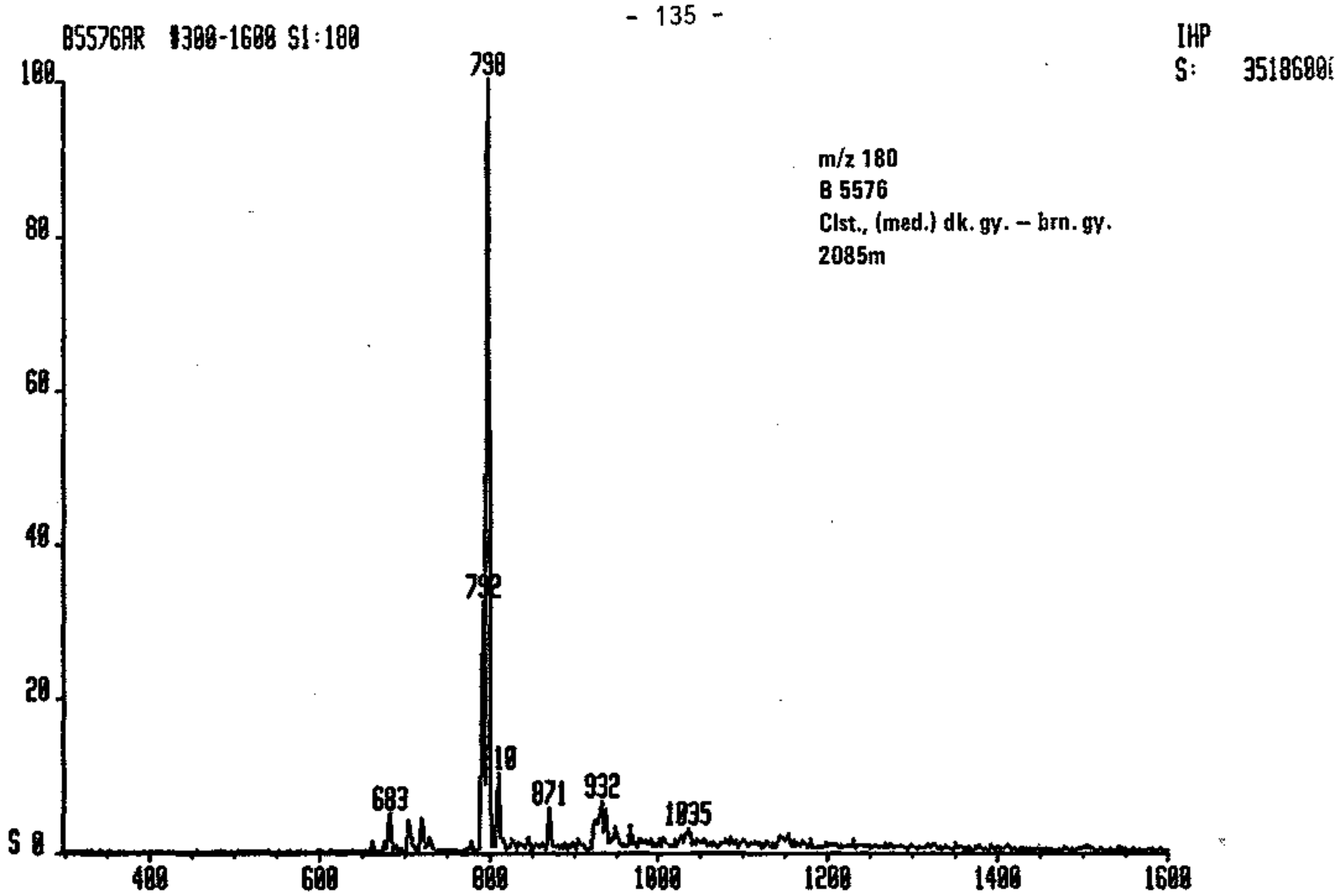
1400
1600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IHP
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m/z 180
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
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80
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40
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S 0
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600
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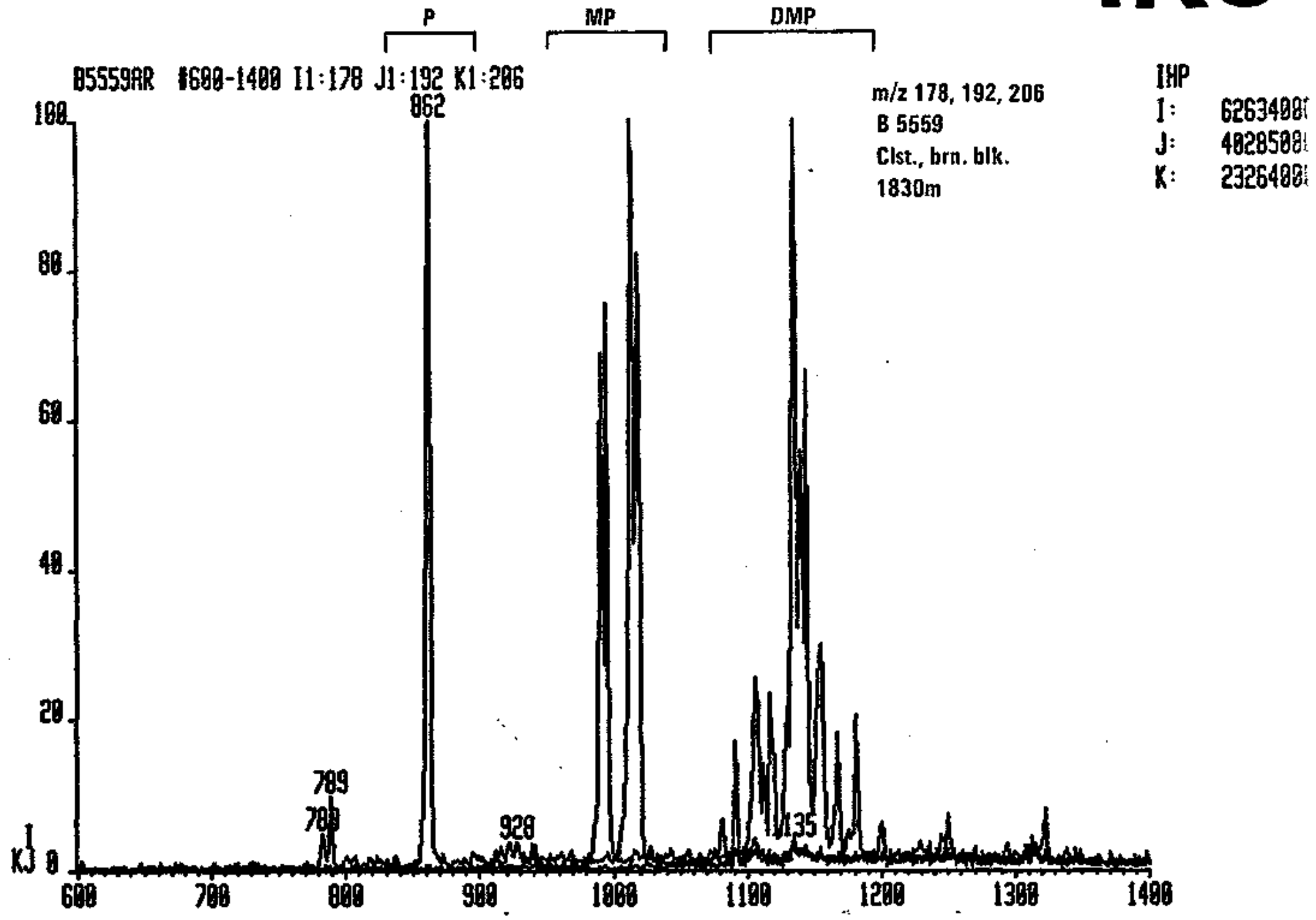
1000
1200
1400
1600

IKU


P
MP
DMP
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789
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20
I
KJ 0
600
700
800
900
1000
1100
1200
1300
1400
m/z 178, 192, 206
B 5559
Clst., brn. blk.
1830m
IHP
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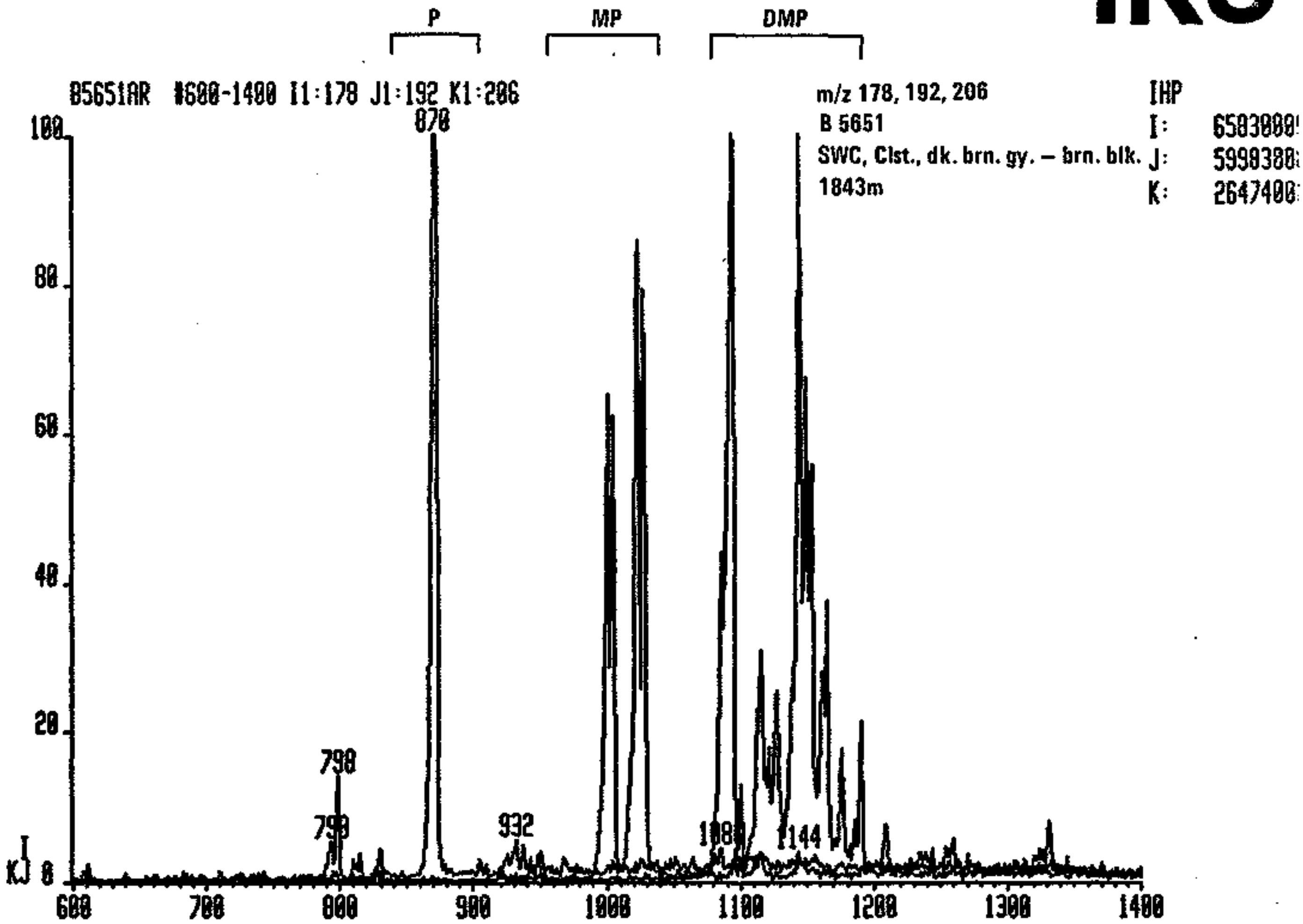
K: 2326408

IKU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MP
DMP
B5651AR #600-1400 I1:178 J1:192 K1:206
m/z 178, 192, 206
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
IHP
I:
J:
K:
870
798
932
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100
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0
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900
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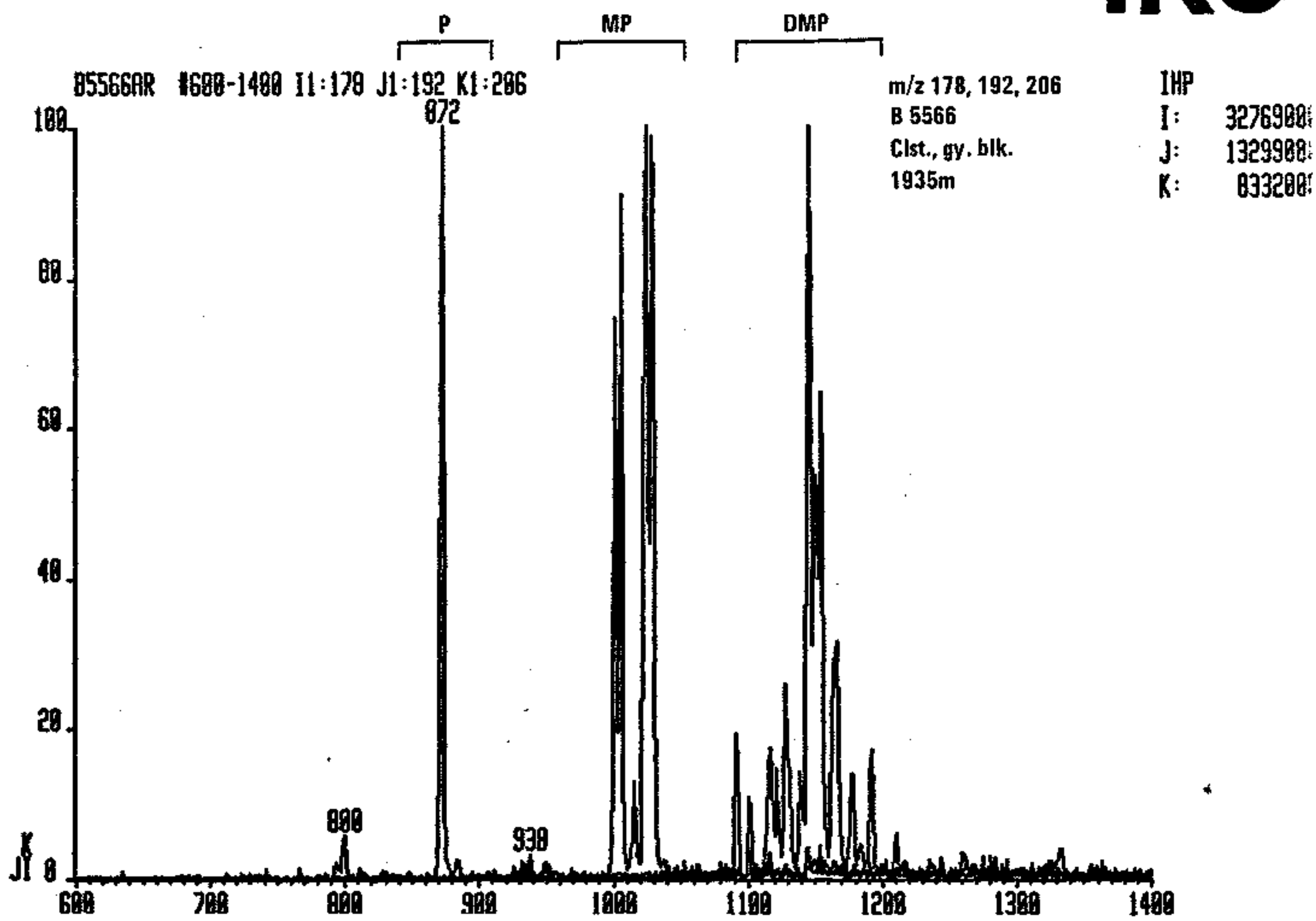
1200
1300
1400

IKU



P
MP
DMP
85566AR #600-1400 I1:178 J1:192 K1:206
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800
930
m/z 178, 192, 206
B 5566
Clst., gy. blk.
1935m
IHP
I: 3276900
J: 1329900
K: 833200
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J I 0
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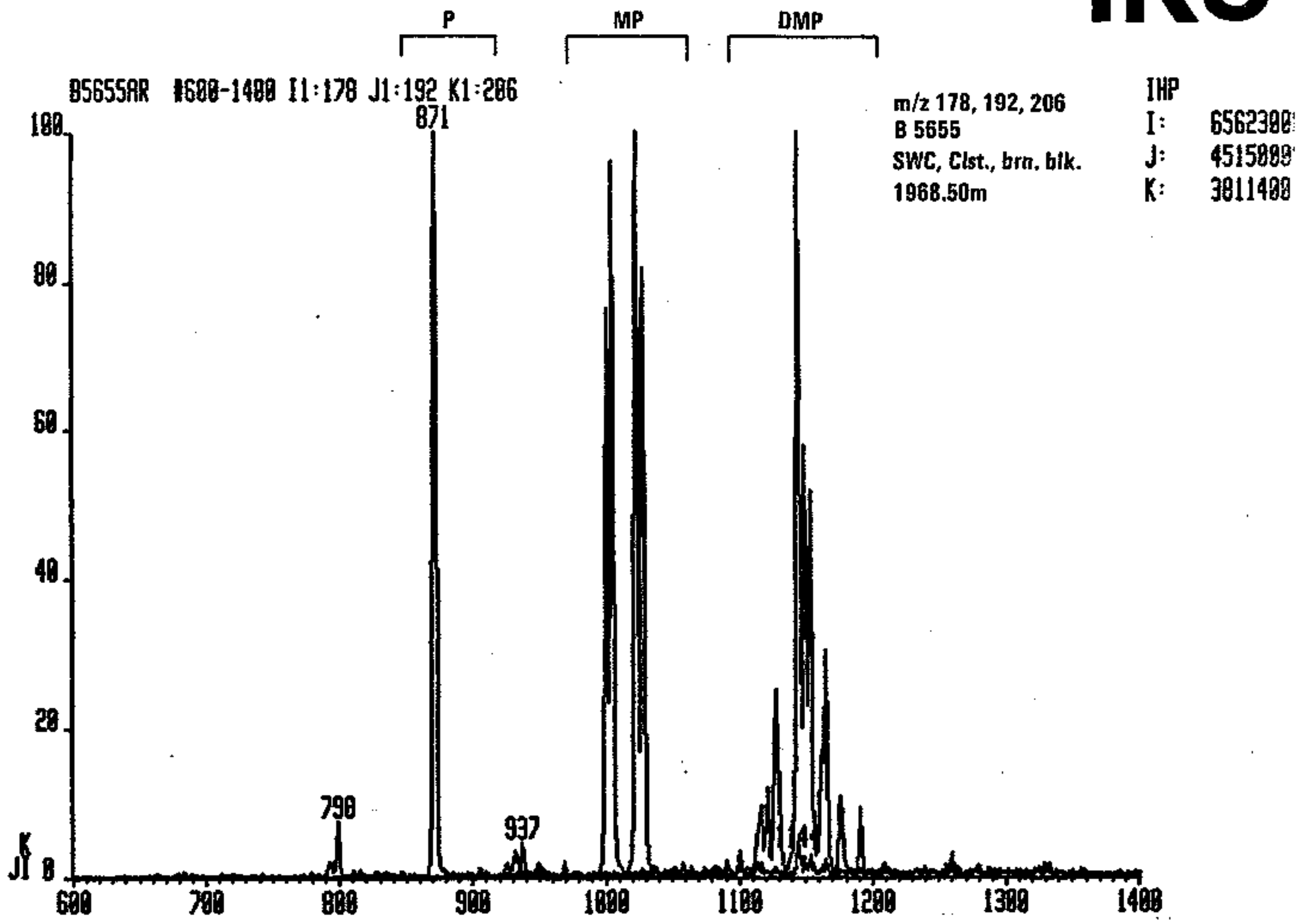
IKU


P
MP
DMP
B5655AR #600-1400 I1:178 J1:192 K1:206
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798
937
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60
40
20
K
JI 0
600
700
800
900
1000
1100
1200
1300
1400
m/z 178, 192, 206
B 5655
SWC, Clst., brn. blk.
1968.50m
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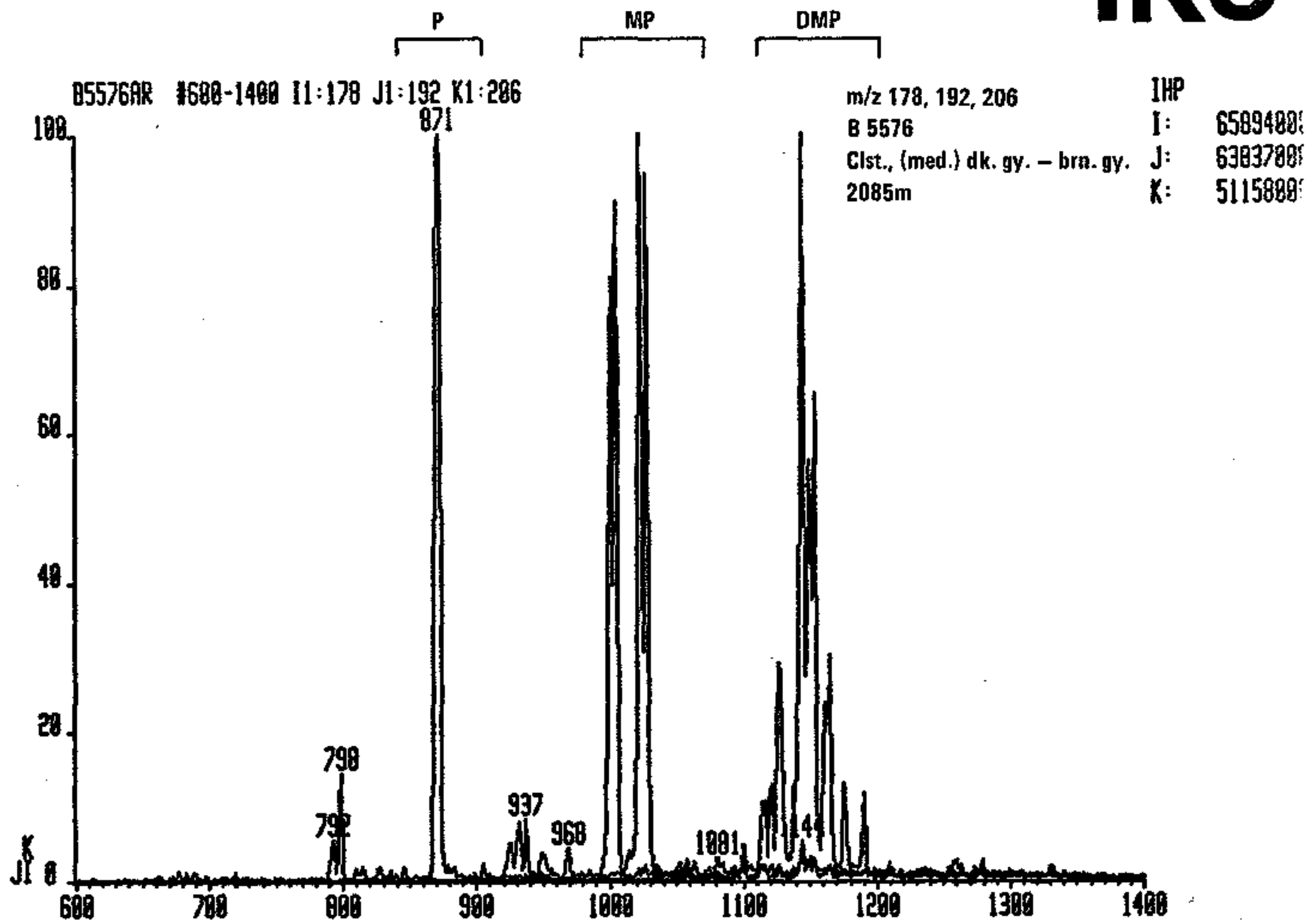
I: 6562300
J: 4515000
K: 3011400

IKU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MP
DMP
B5576AR #600-1400 I1:178 J1:192 K1:206
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798
792
937
968
1081
1144
m/z 178, 192, 206
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
IHP
I: 6509400
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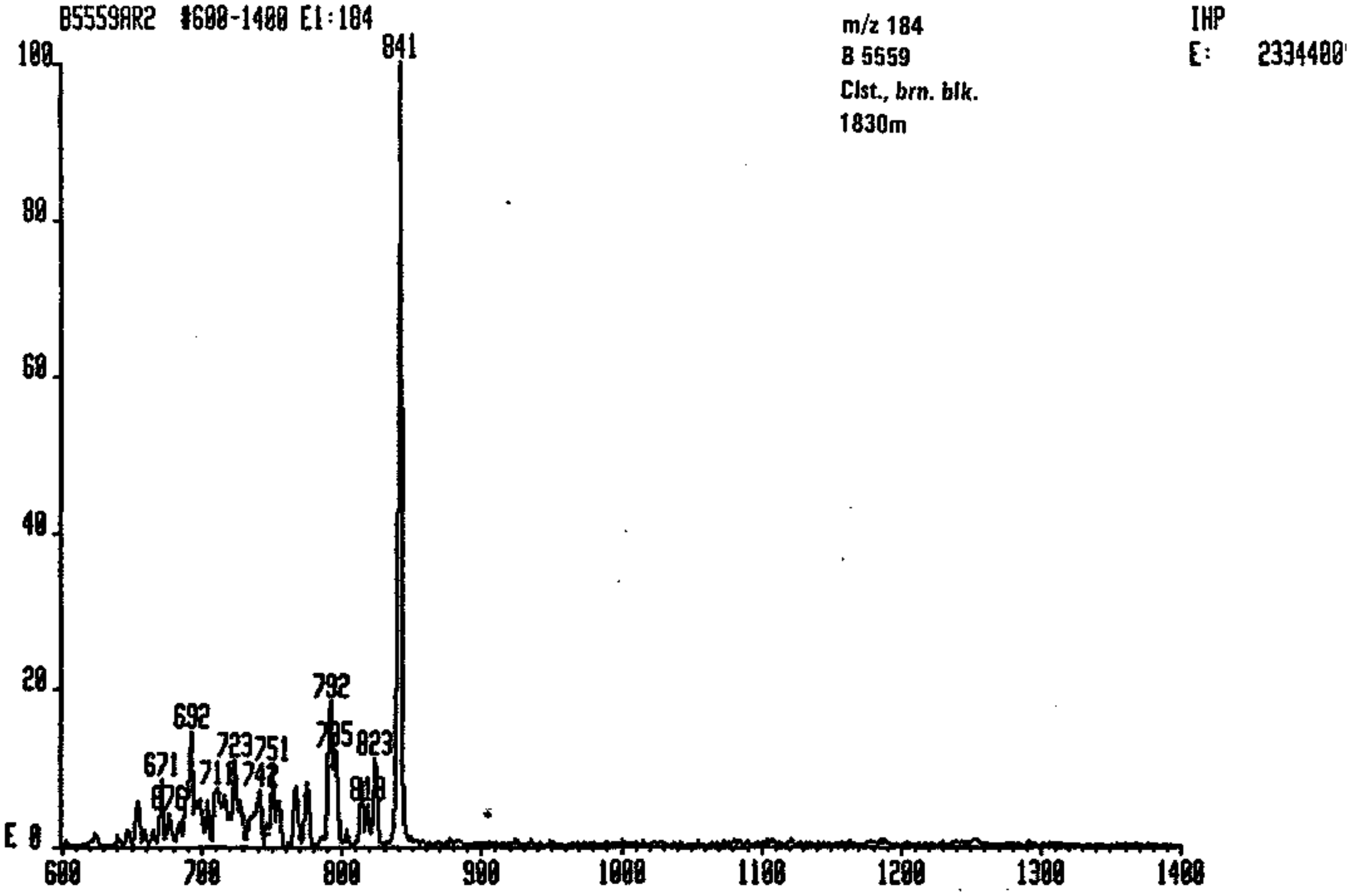
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Clst., brn. blk.
1830m
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723751
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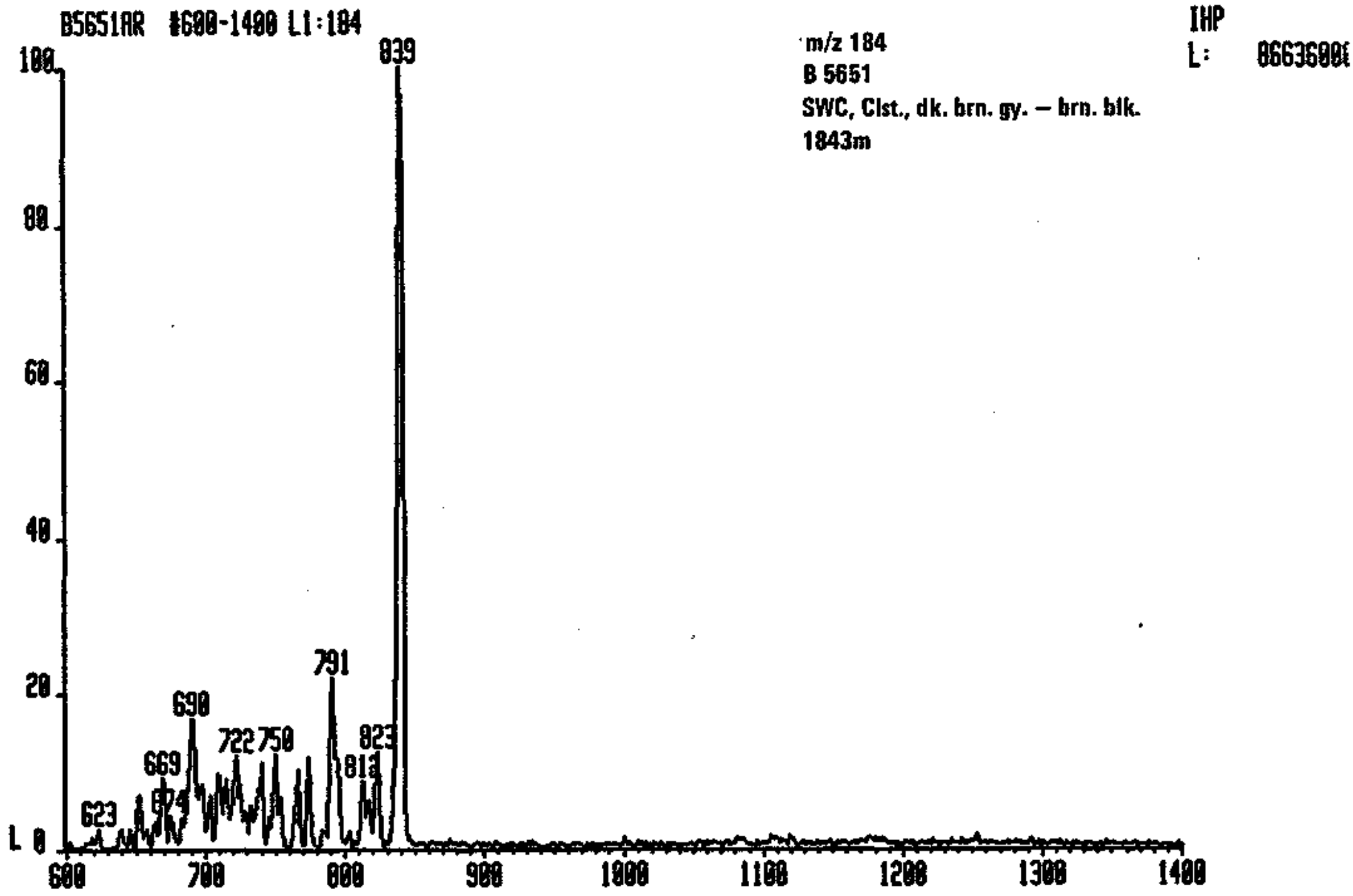
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m/z 184
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
IHP
L: 8663600
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791
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722750
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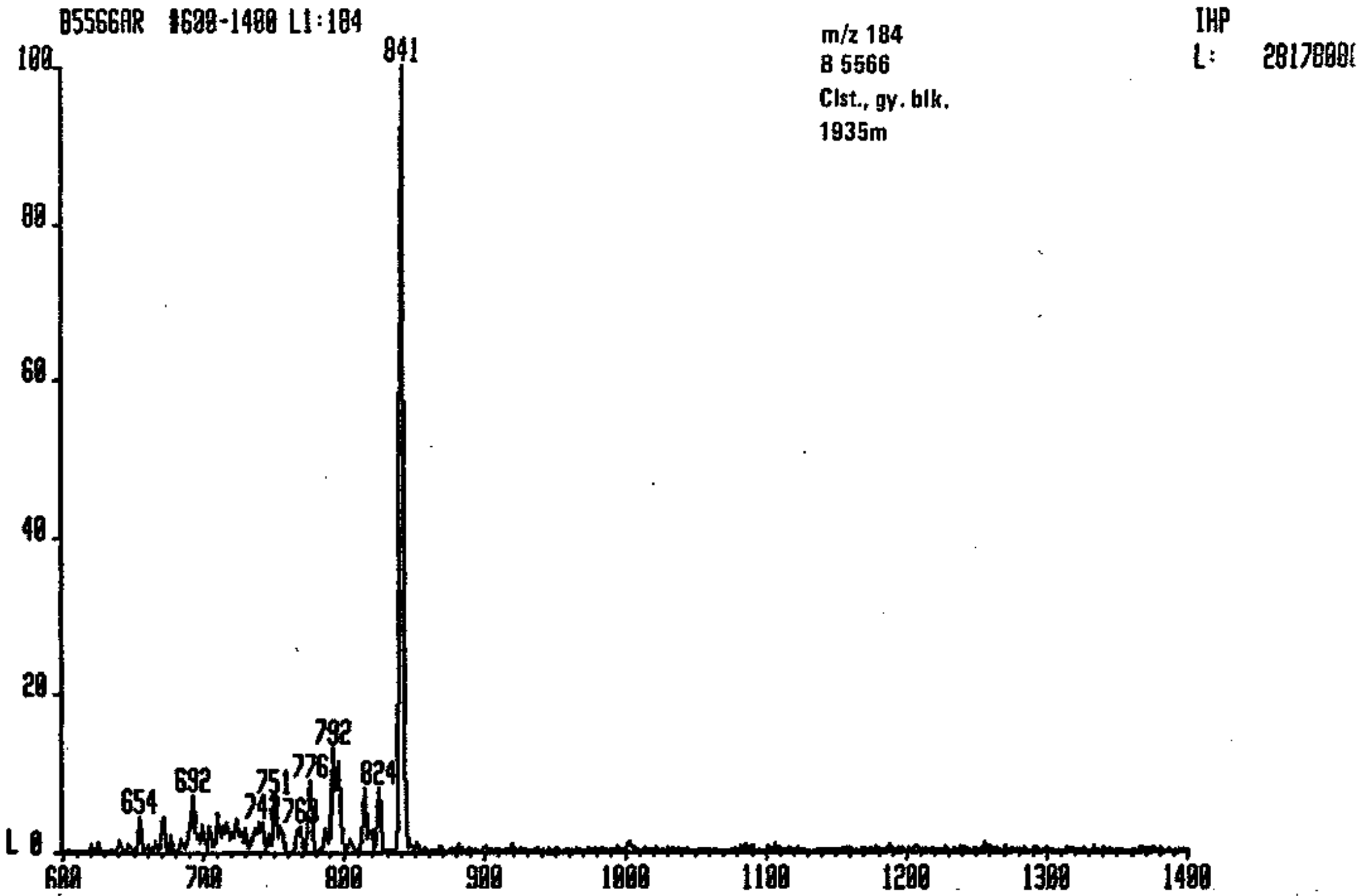
IKU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m/z 184
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Clst., gy. blk.
1935m
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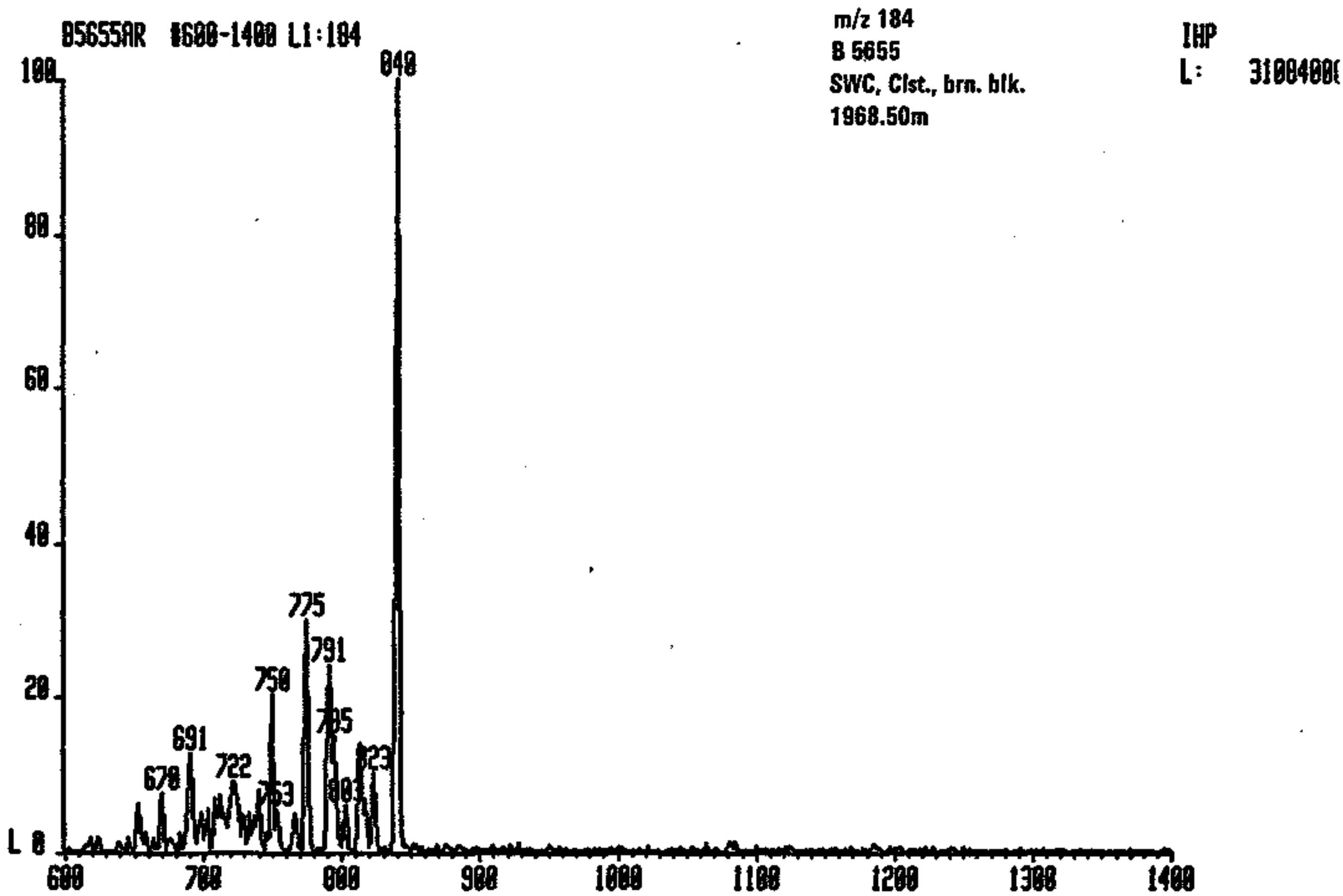
B5655AR #600-1400 L1:184
m/z 184
B 5655
SWC, Clst., brn. blk.
1968.50m
IHP
L: 3100400
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L 0
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900
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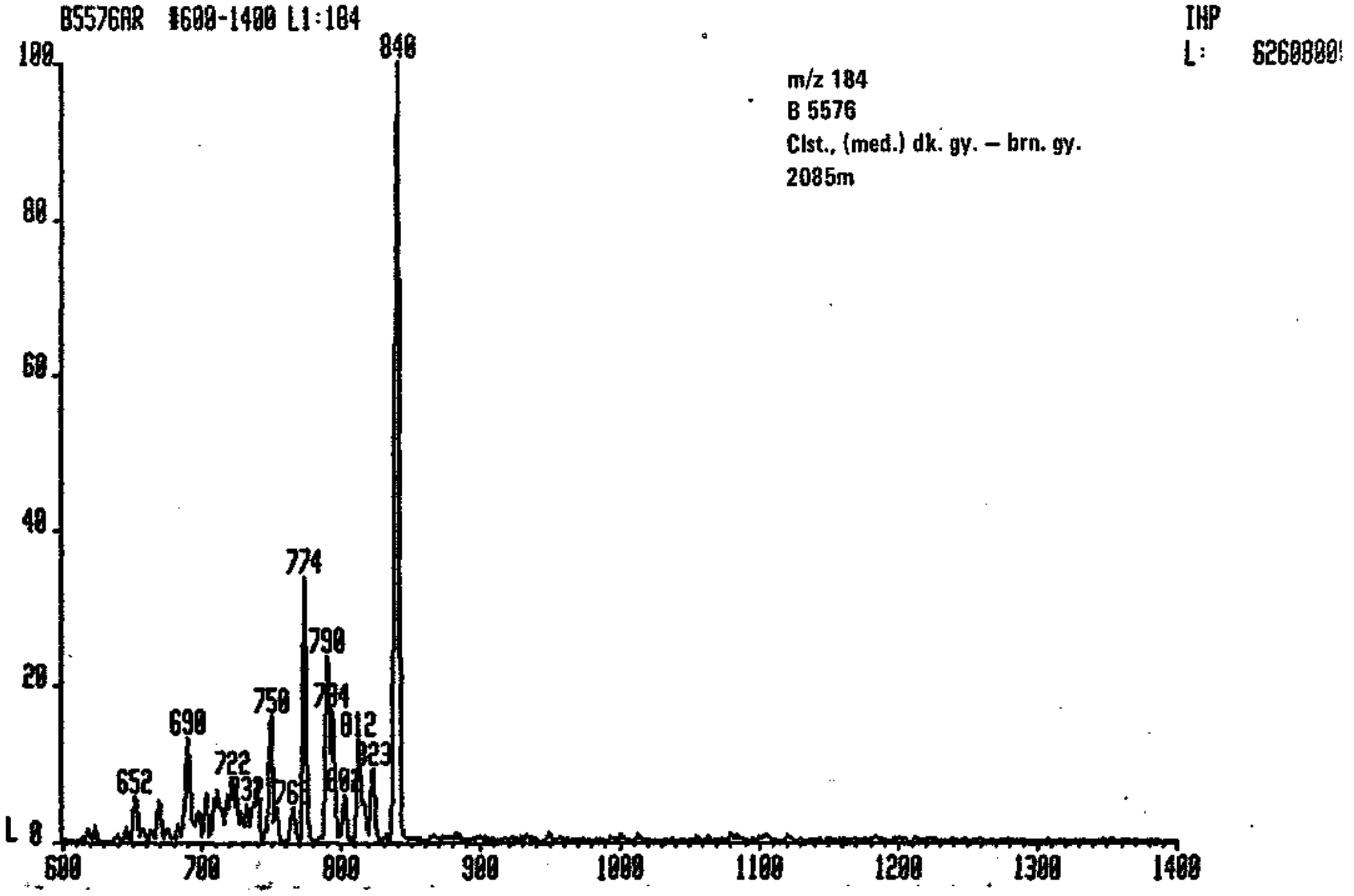
1200
1300
1400

IKU


B5576AR #600-1400 L1:184
INP
L: 6260800!
m/z 184
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
840
774
790
750
784
690
812
823
722
732
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768
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L 0
100
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60
40
20
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700
800
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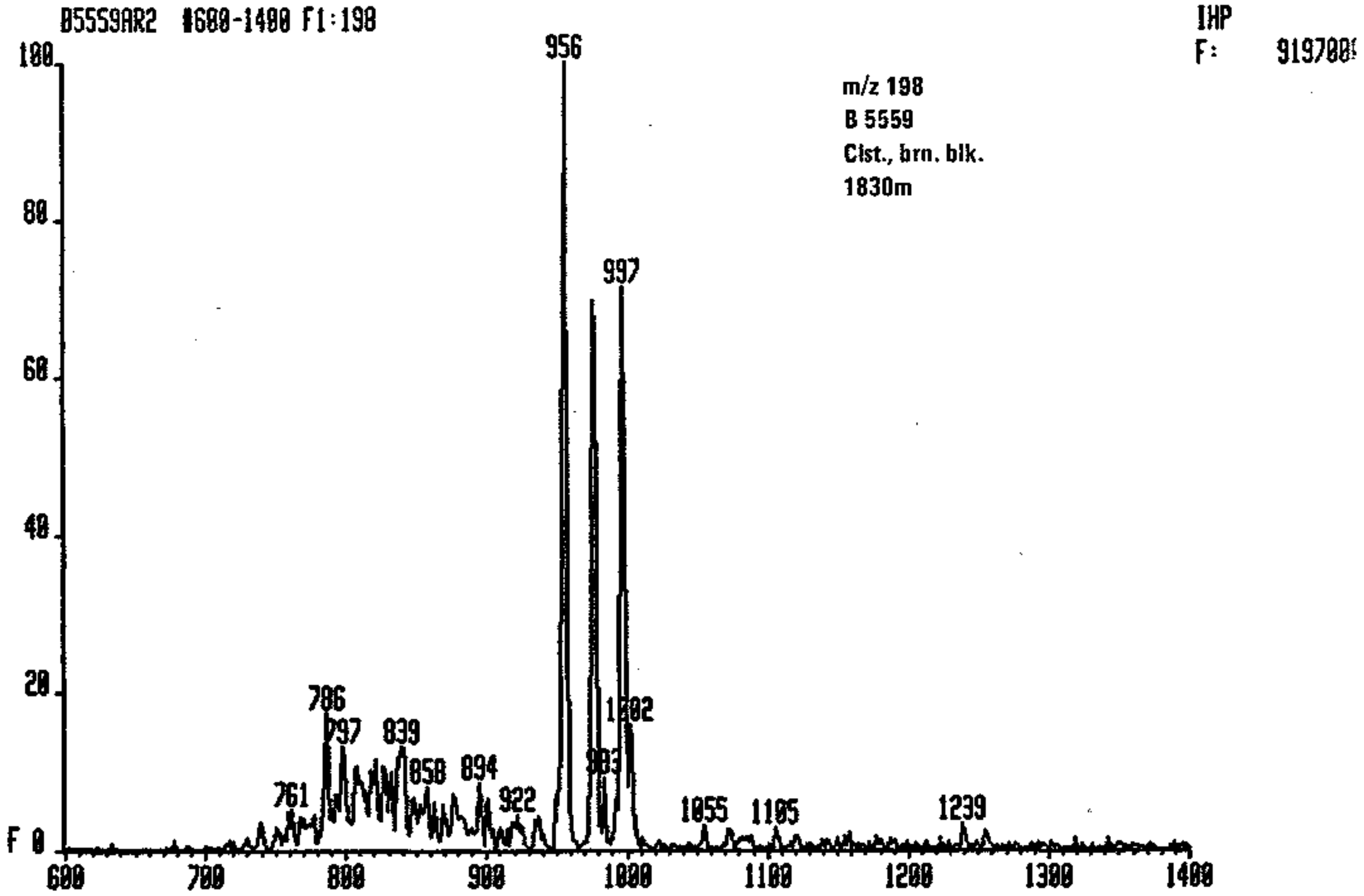
1200
1300
1400


B5559AR2 #600-1400 F1:198
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F: 9197008
m/z 198
B 5559
Clst., brn. blk.
1830m
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797
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761
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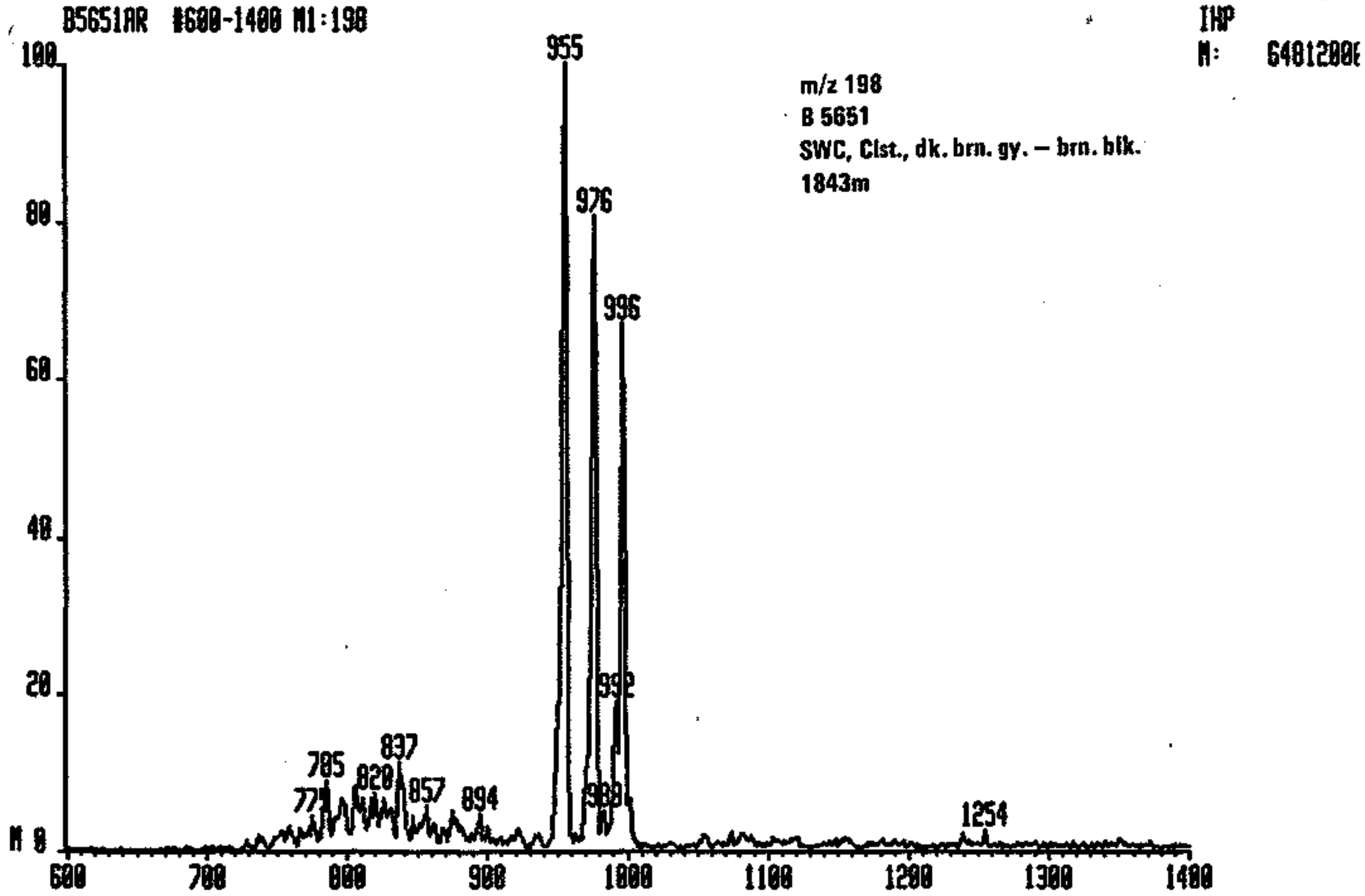
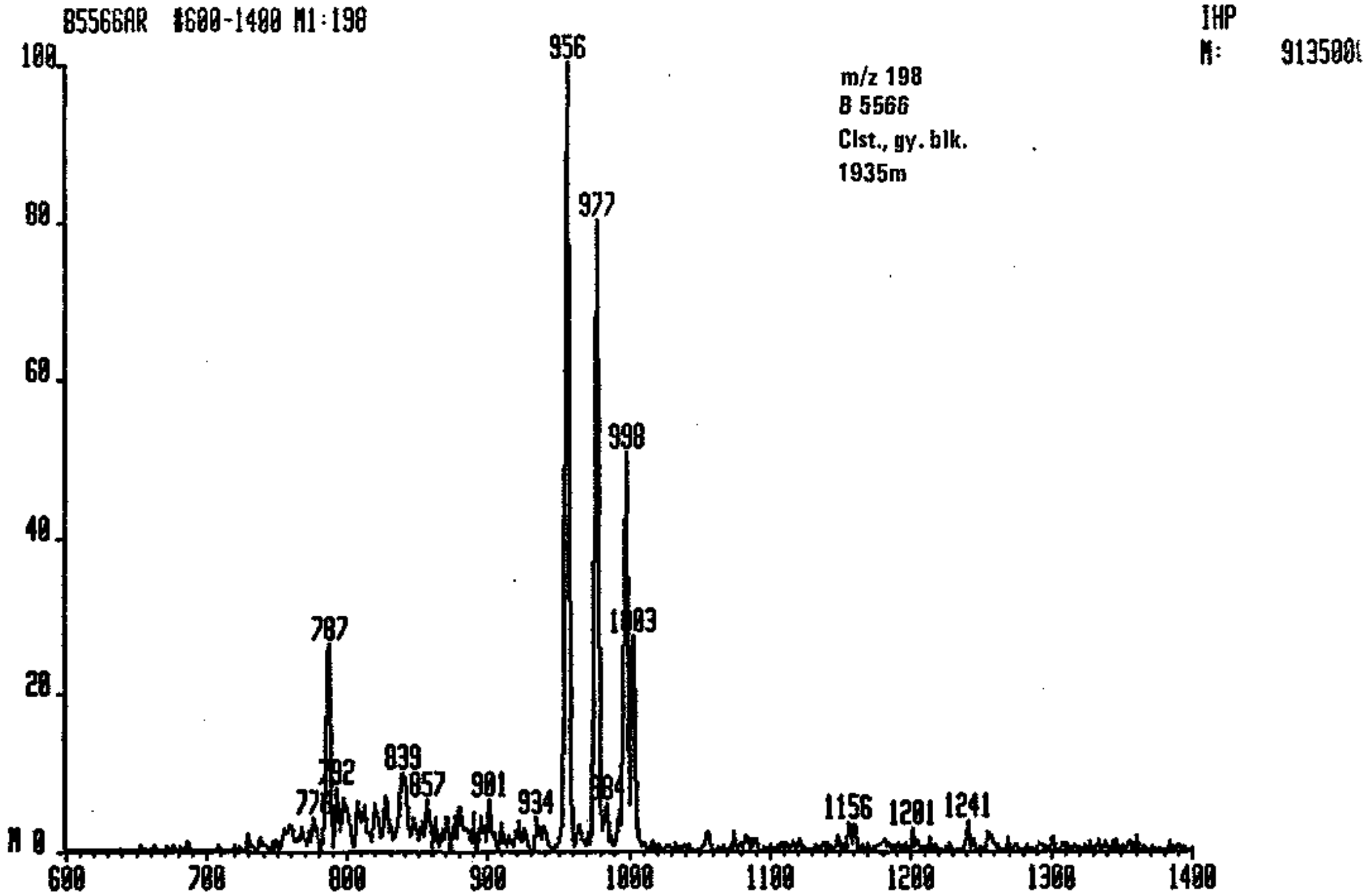
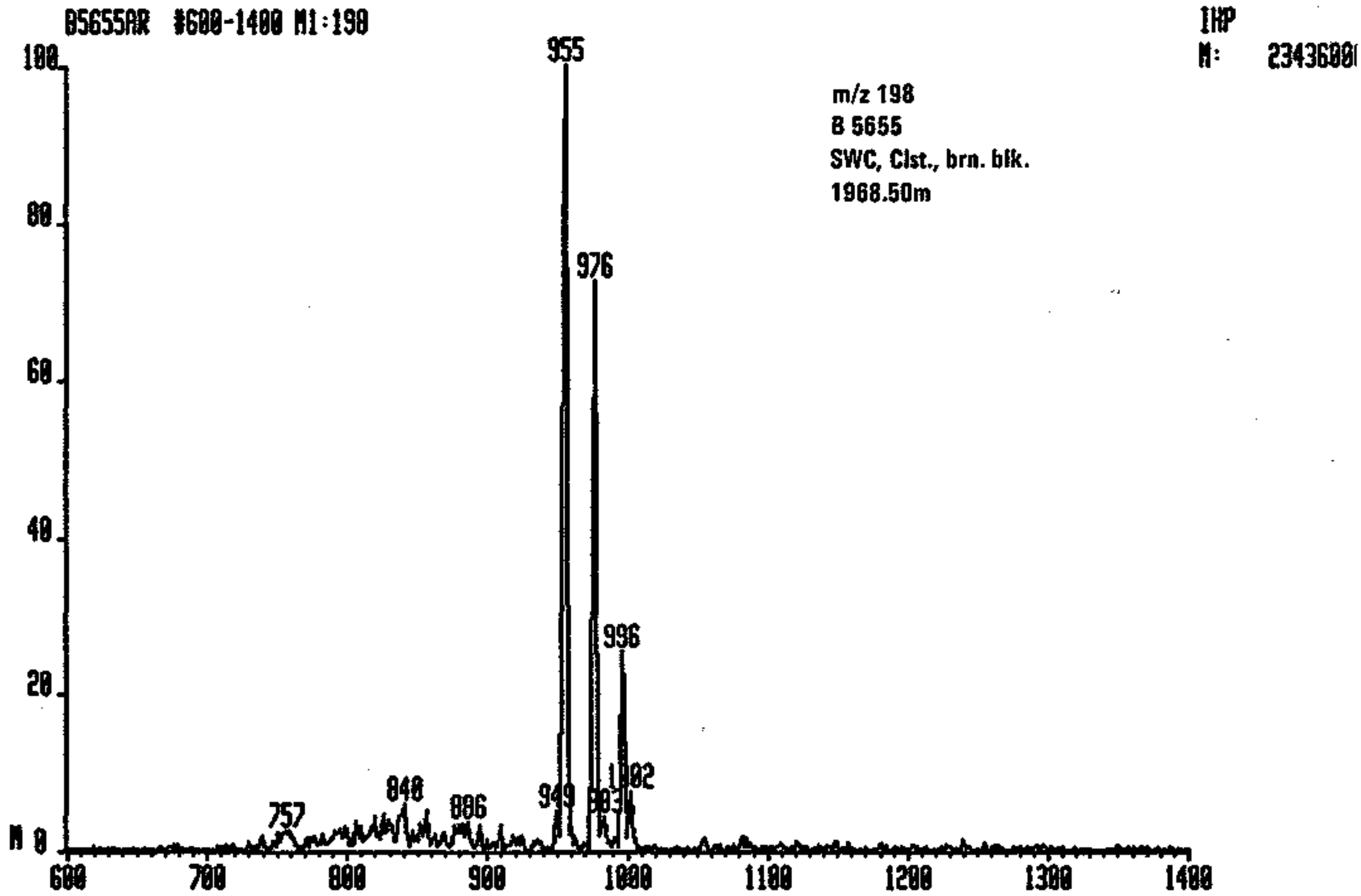
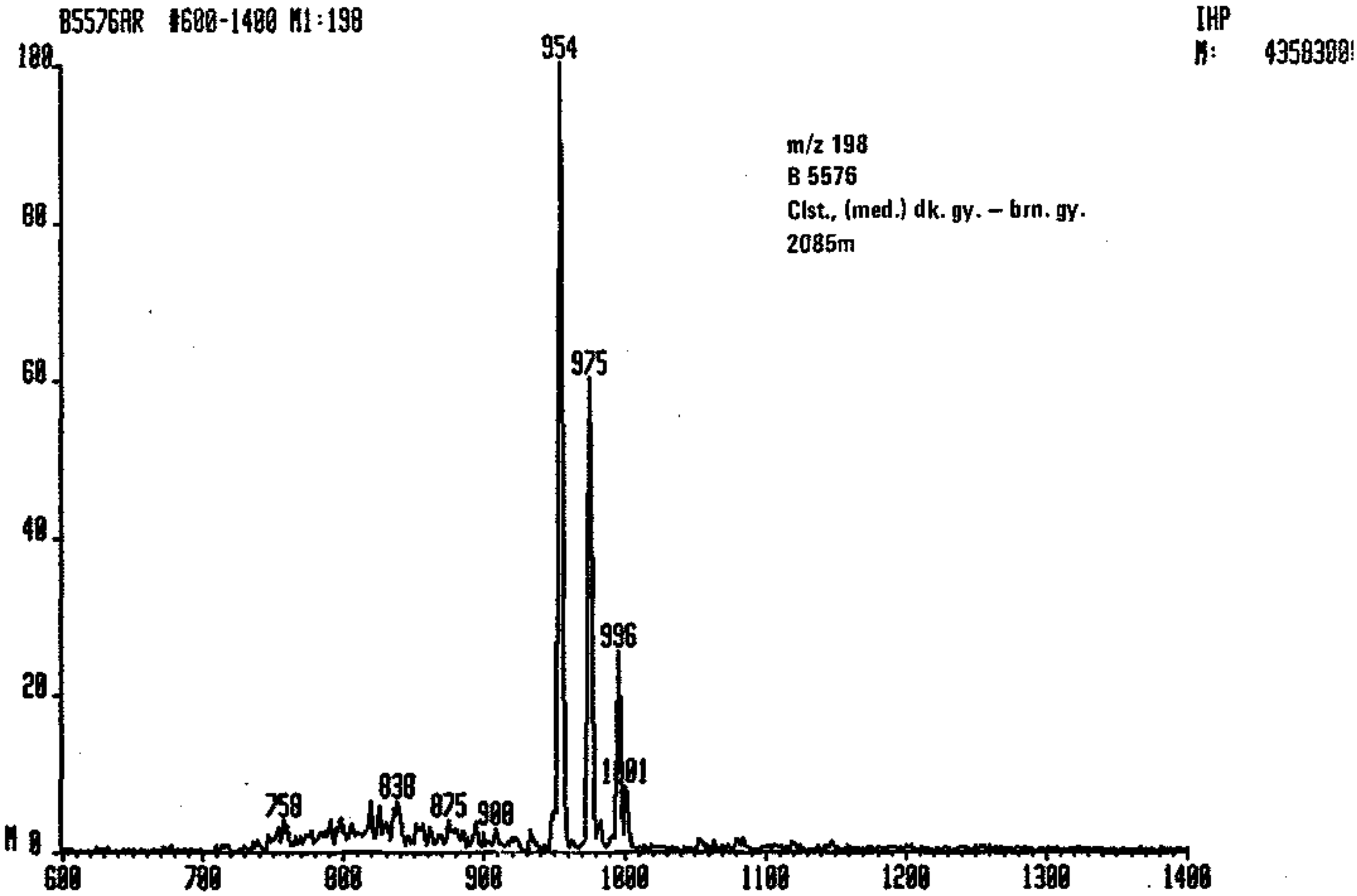
1300
1400

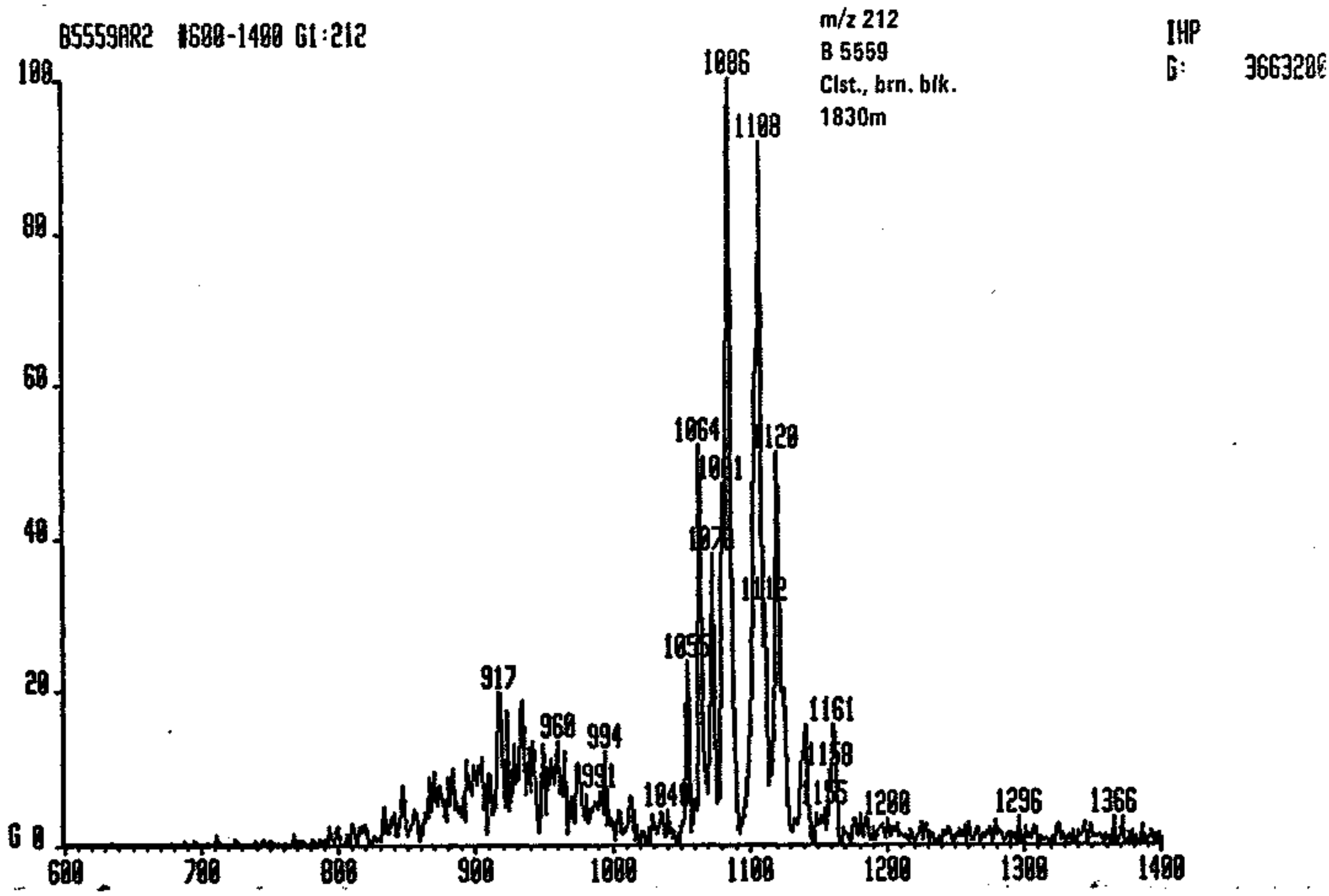

B5651AR #600-1400 M1:198
IHP
M: 6401200
m/z 198
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
955
976
996
992
837
785
820
857
894
983
1254
M 0
600
700
800
900
1000
1100
1200
1300
1400

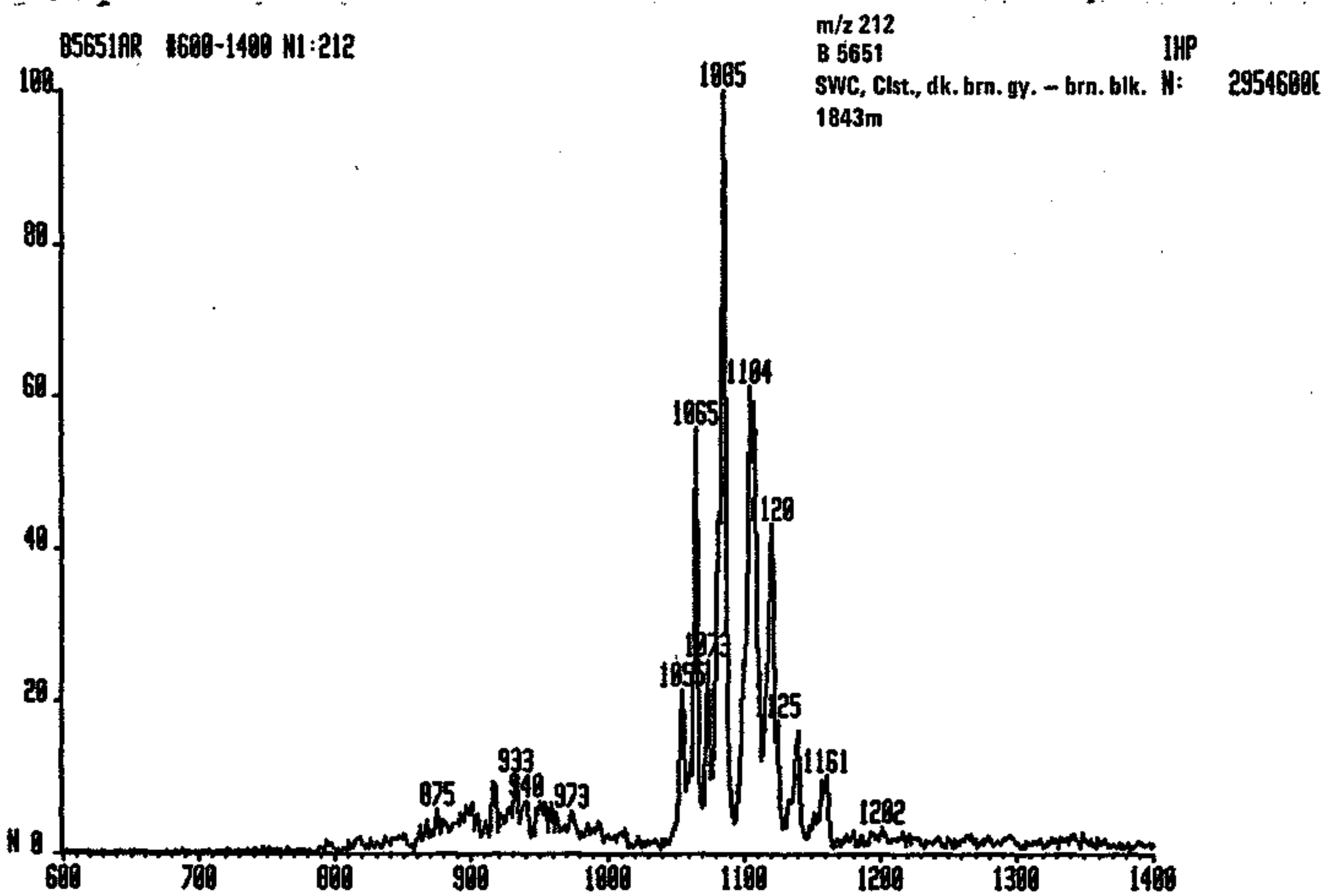

B5566AR #600-1400 MI:198
IHP
M: 913500
m/z 198
B 5566
Clst., gy. blk.
1935m
956
977
998
1003
787
839
857
901
934
1156
1201
1241
600
700
800
900
1000
1100
1200
1300
1400


B5655AR #600-1400 MI:198
IHP
M: 2343600
m/z 198
B 5655
SWC, Clst., brn. blk.
1968.50m
955
976
996
1002
757
840
886
949
600
700
800
900
1000
1100
1200
1300
1400

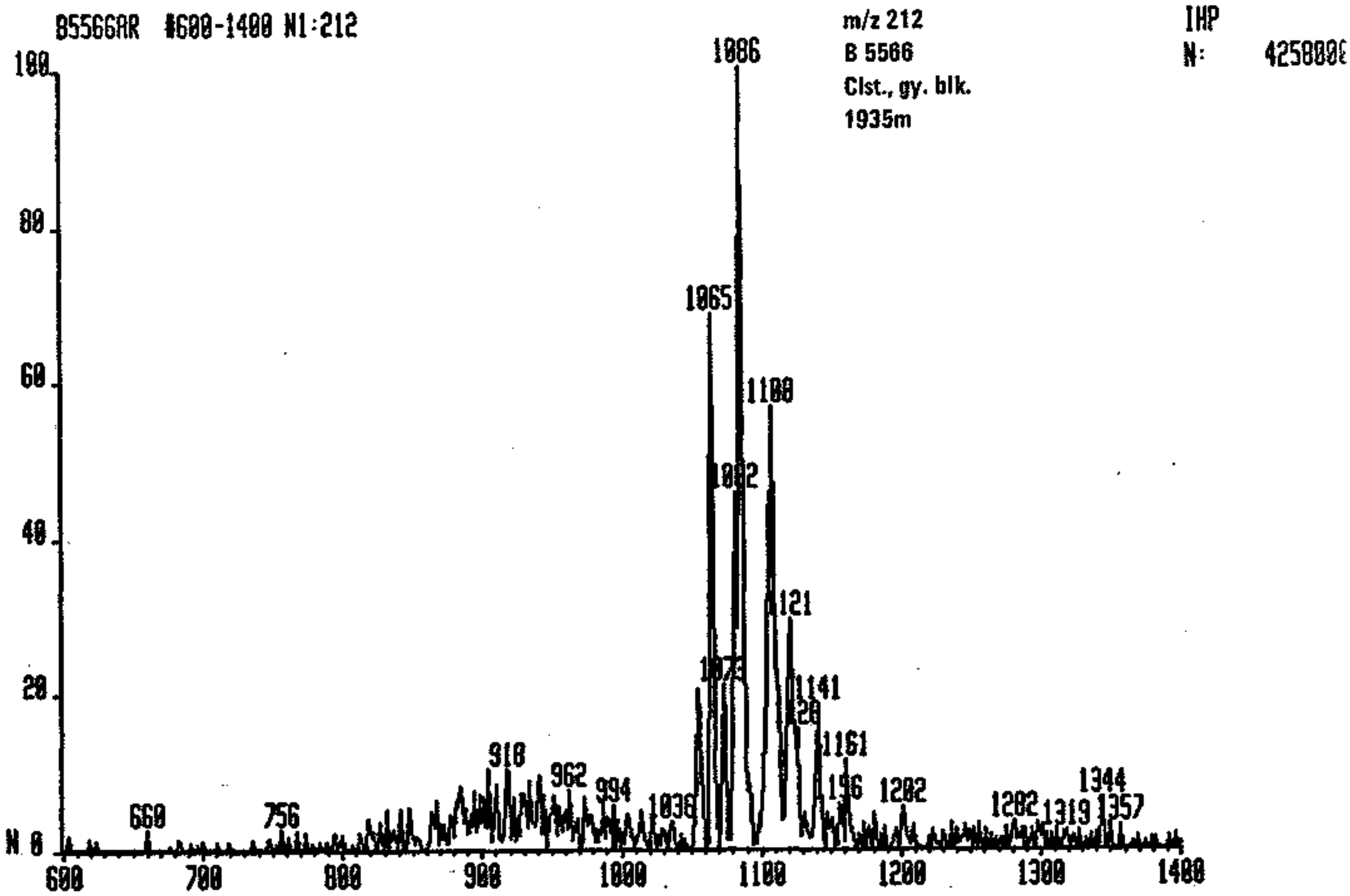

B5576AR #600-1400 M1:198
IHP
M: 4358300
m/z 198
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
954
975
996
1001
750
838
875
900
100
80
60
40
20
0
600
700
800
900
1000
1100
1200
1300
1400

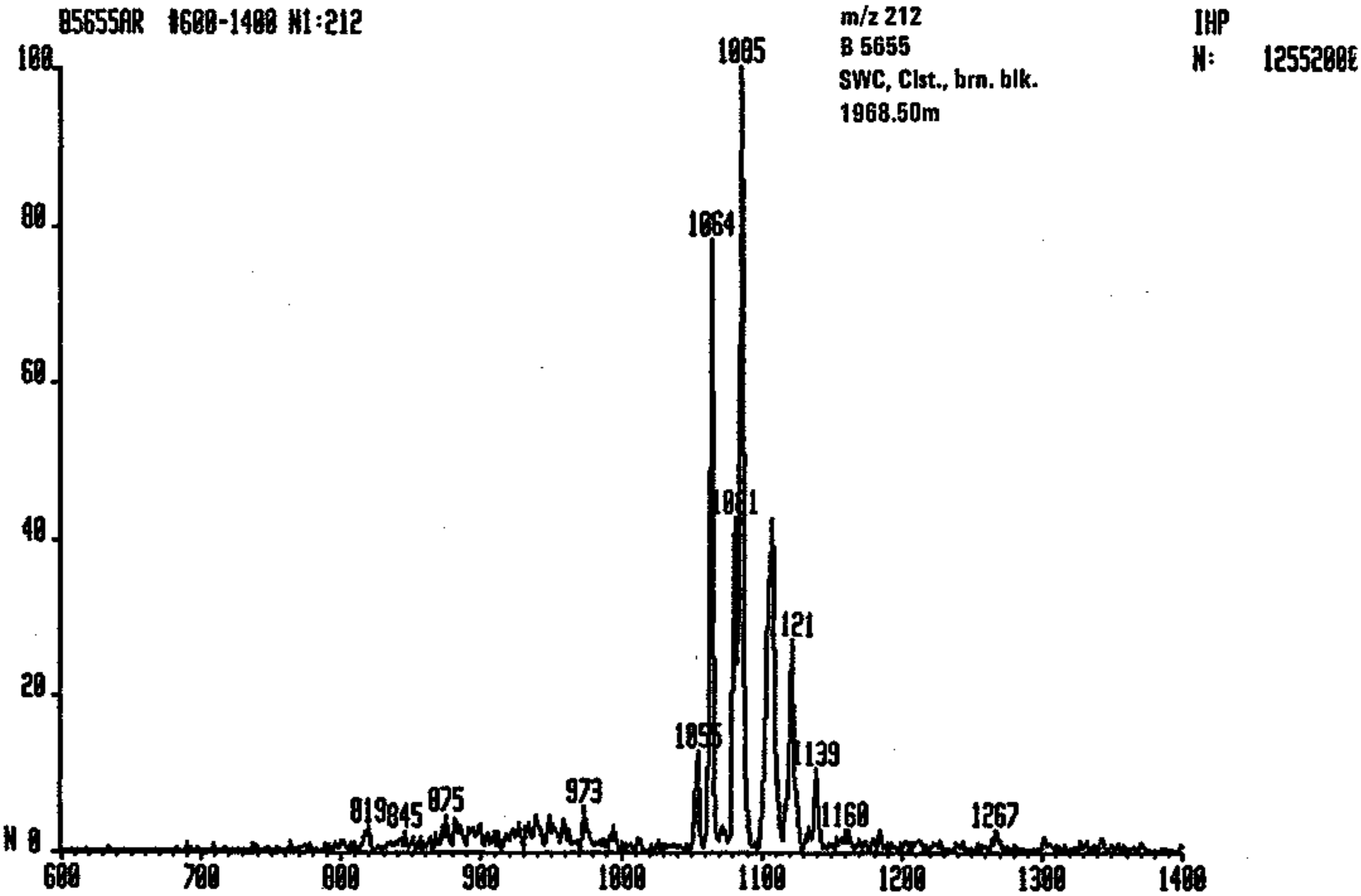
IKU


B5559AR2 #600-1400 G1:212
m/z 212
B 5559
Clst., brn. blk.
1830m
IHP
G: 3663200
1086
1108
1064
1120
1073
1112
1055
917
960
994
991
1161
1158
1040
1155
1200
1296
1366

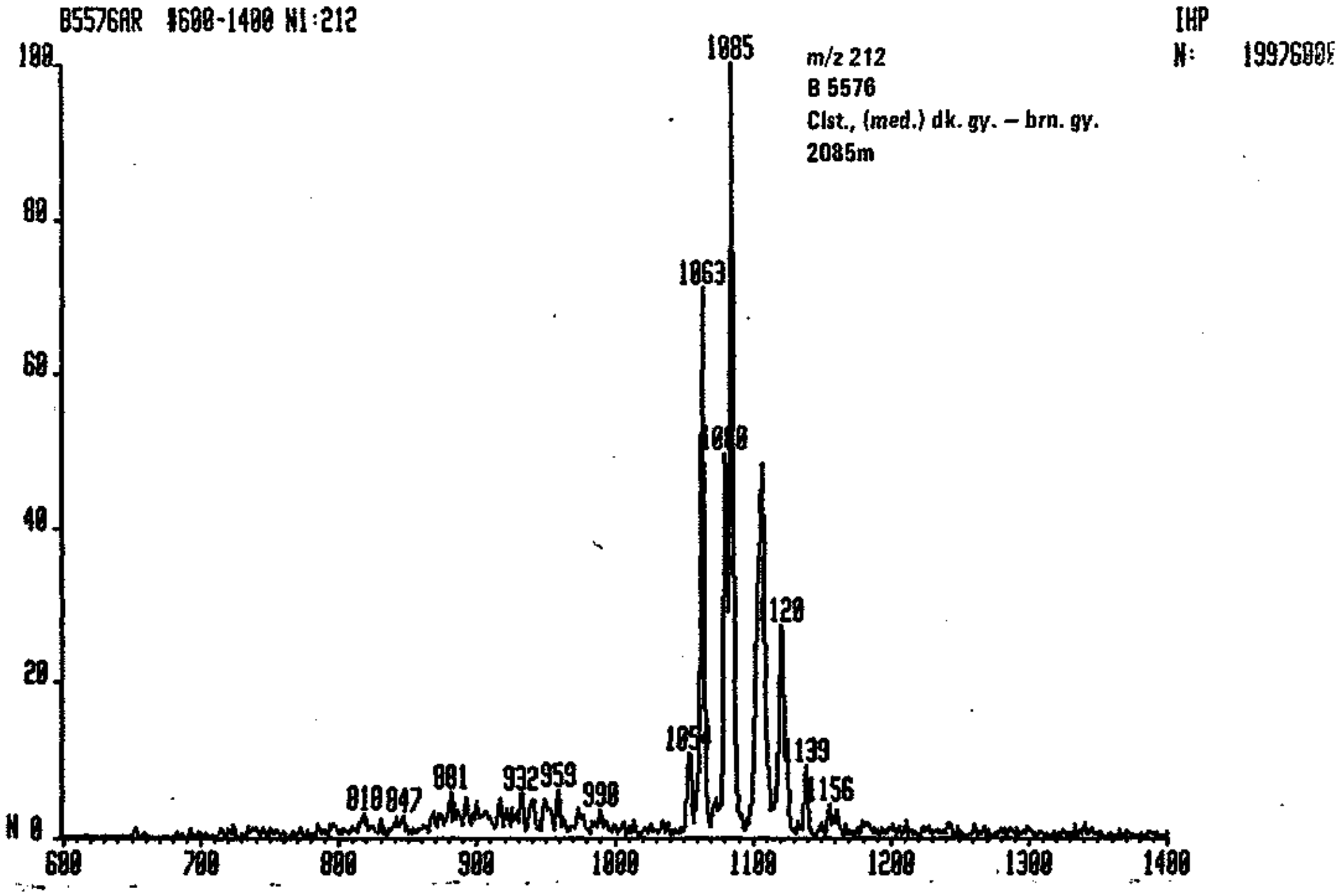

B5651AR #600-1400 N1:212
m/z 212
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
IHP
N: 29546000
1085
1104
1065
1120
1073
1055
1125
933
875
940
973
1161
1202

IKU

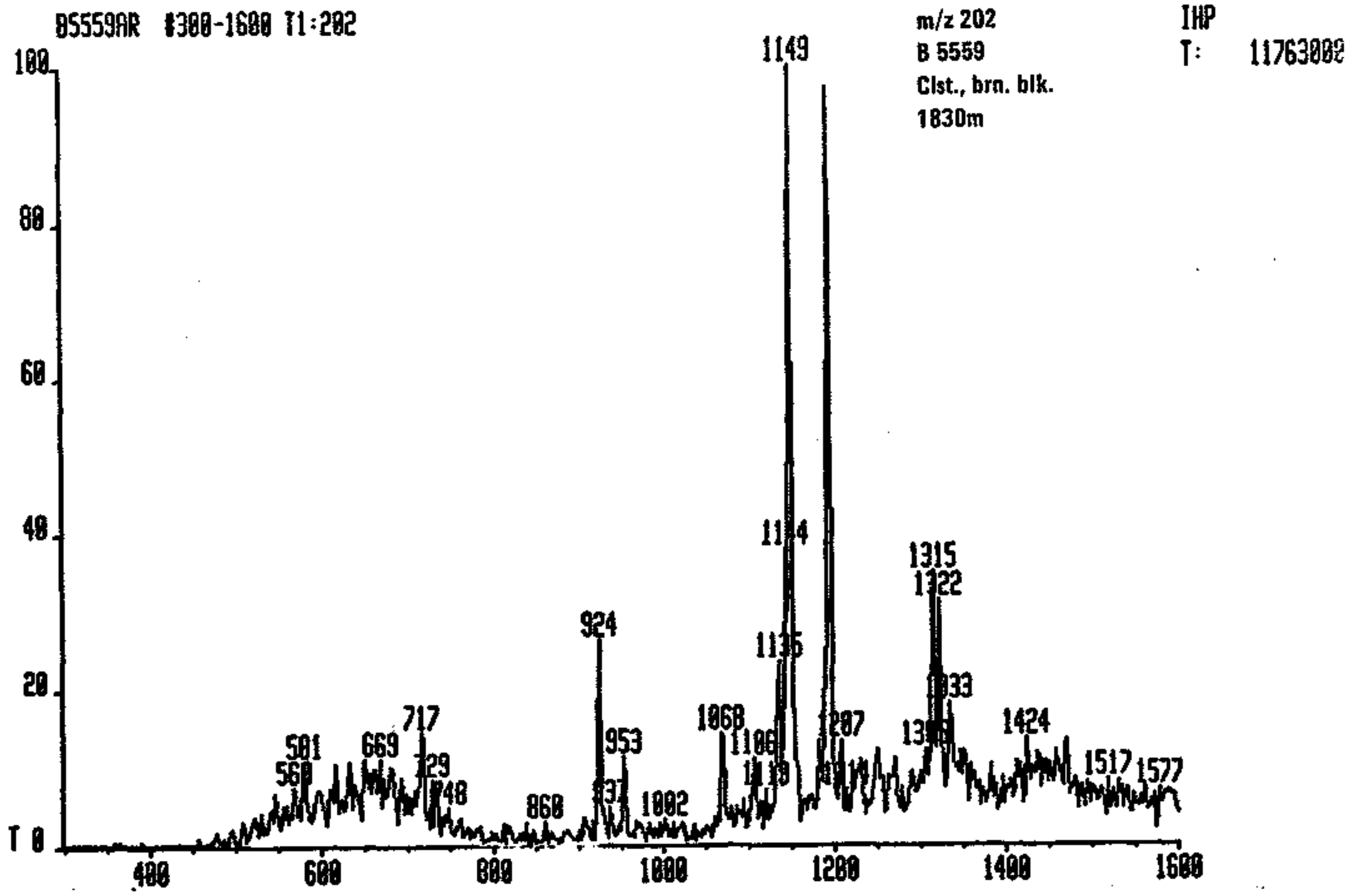

B5566AR #600-1400 N1:212
m/z 212
B 5566
Clst., gy. blk.
1935m
IHP
N: 4258000
1086
1065
1100
1082
1121
1073
1141
1128
1161
918
962
994
1036
1156
1202
1282
1319
1344
1357
660
756
100
80
60
40
20
N 0
600
700
800
900
1000
1100
1200
1300
1400

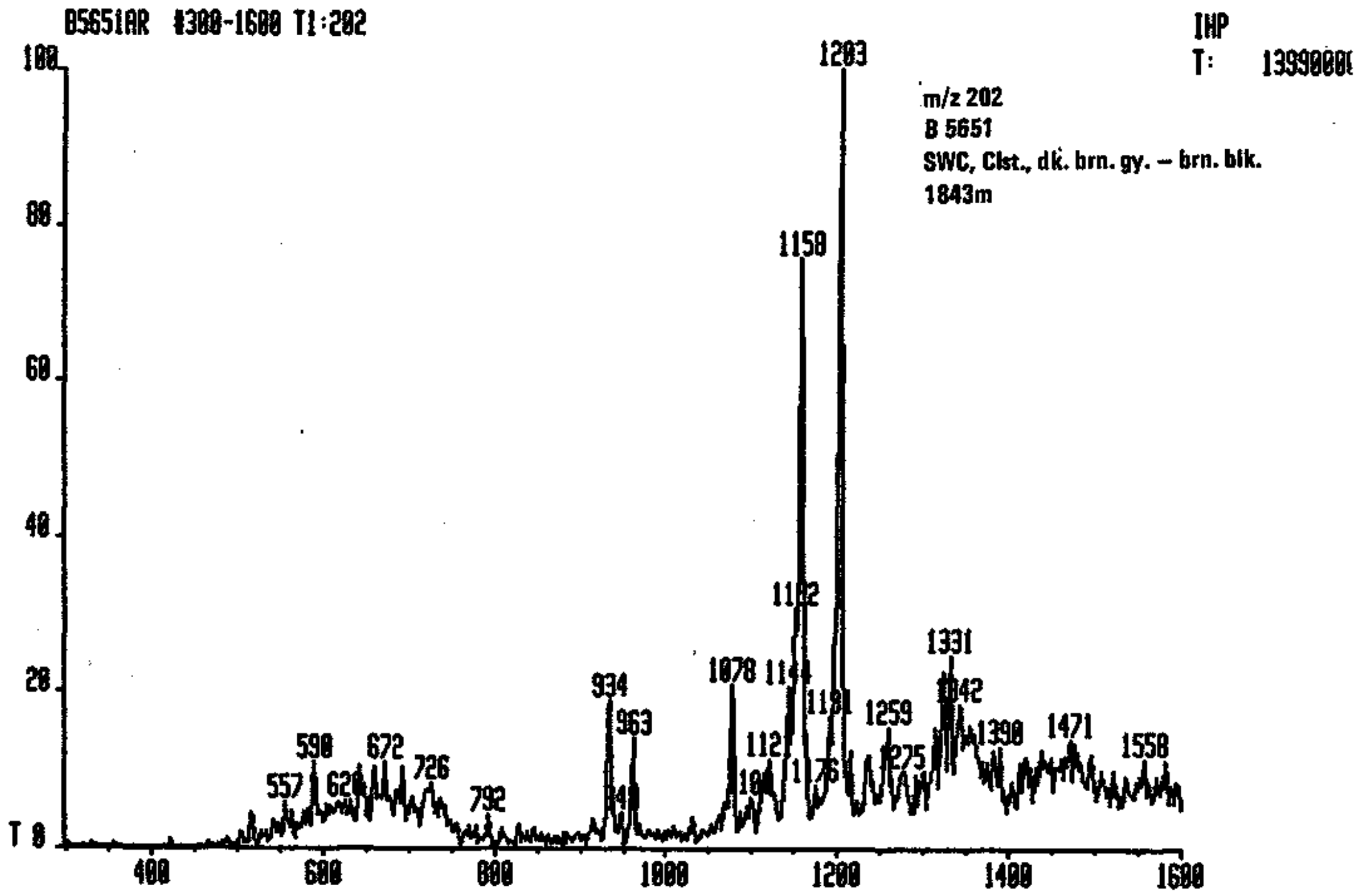

B5655AR #600-1400 N1:212
m/z 212
B 5655
SWC, Clst., brn. blk.
1968.50m
IHP
N: 1255200
1085
1064
1081
1121
1055
1139
973
819
845
875
1160
1267
100
80
60
40
20
N 0
600
700
800
900
1000
1100
1200
1300
1400

IKU

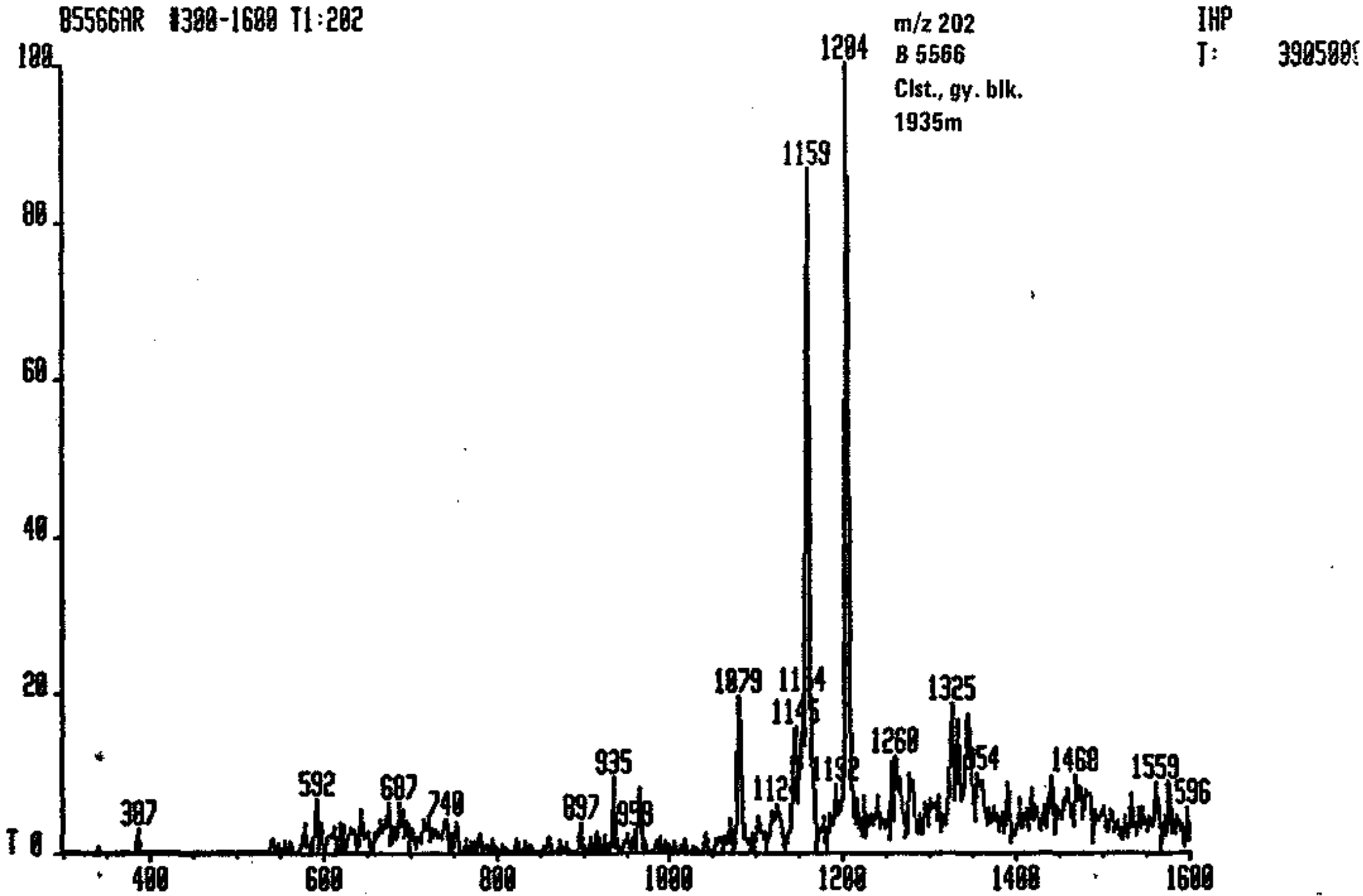

B5576AR #600-1400 NI:212
IHP
N: 1997600
m/z 212
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
1085
1063
1054
1120
1139
1156
881
932
959
998
810
847
100
80
60
40
20
N 0
600
700
800
900
1000
1100
1200
1300
1400

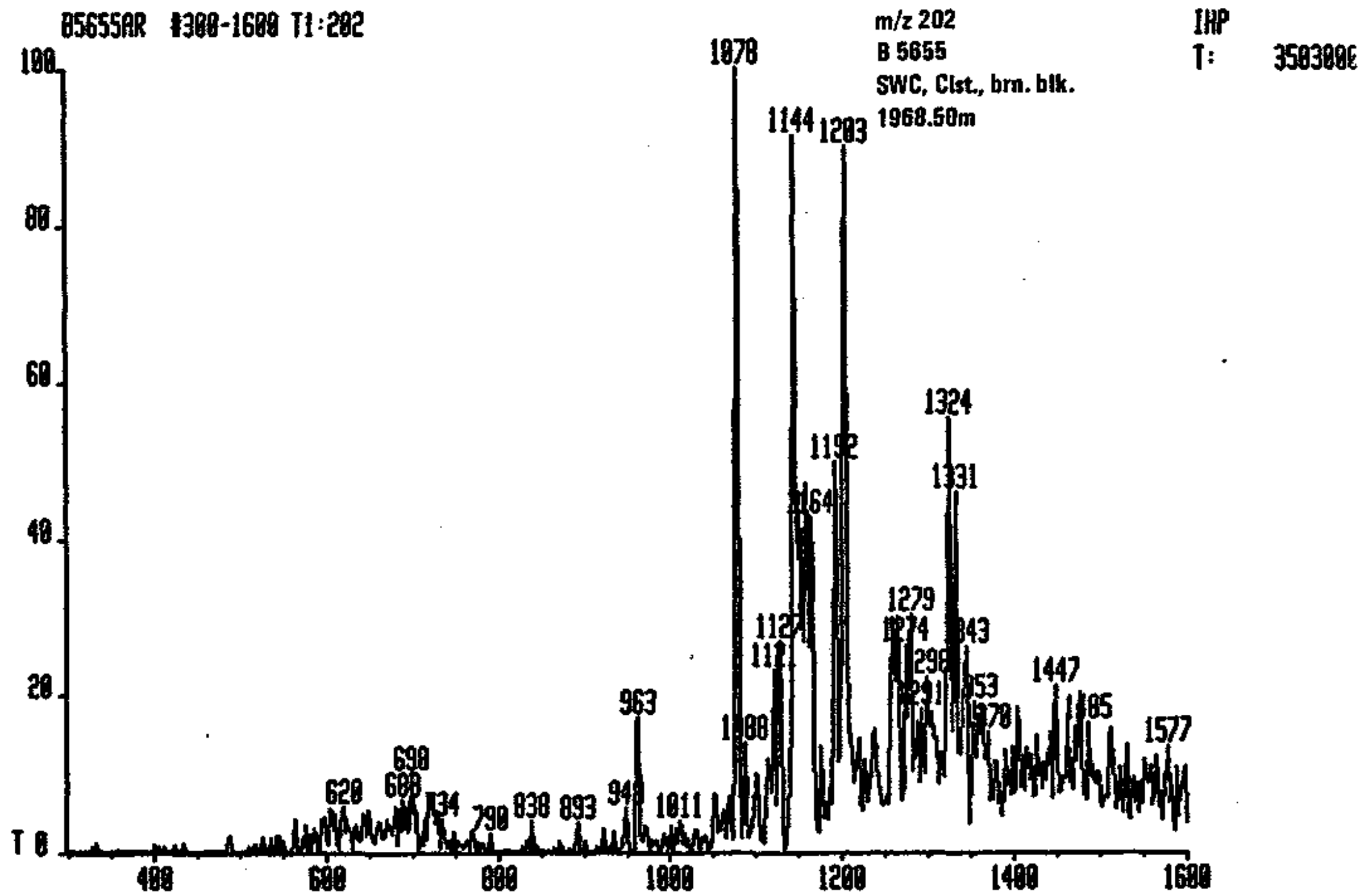
IKU


B5559AR #300-1600 TI:202
m/z 202
B 5559
Clst., brn. blk.
1830m
IHP
T: 11763002
1149
924
1315
1322
1424
1517
1577
717
669
581
953
1068
1002
860
400
600
800
1000
1200
1400
1600

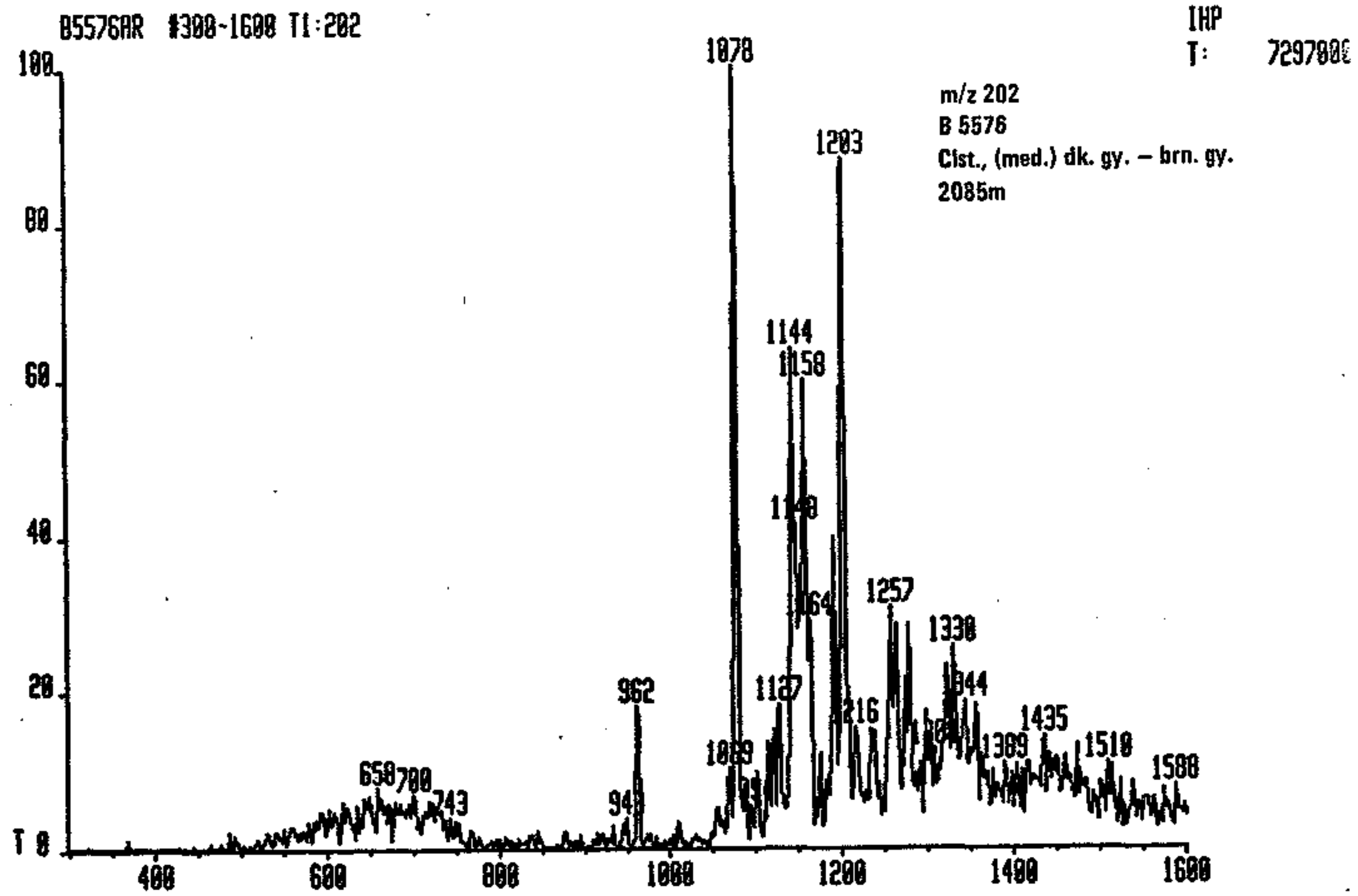

B5651AR #300-1600 TI:202
IHP
T: 1399000
1203
m/z 202
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
1158
1331
1078
934
963
1259
1390
1471
1558
598
672
726
557
792
400
600
800
1000
1200
1400
1600

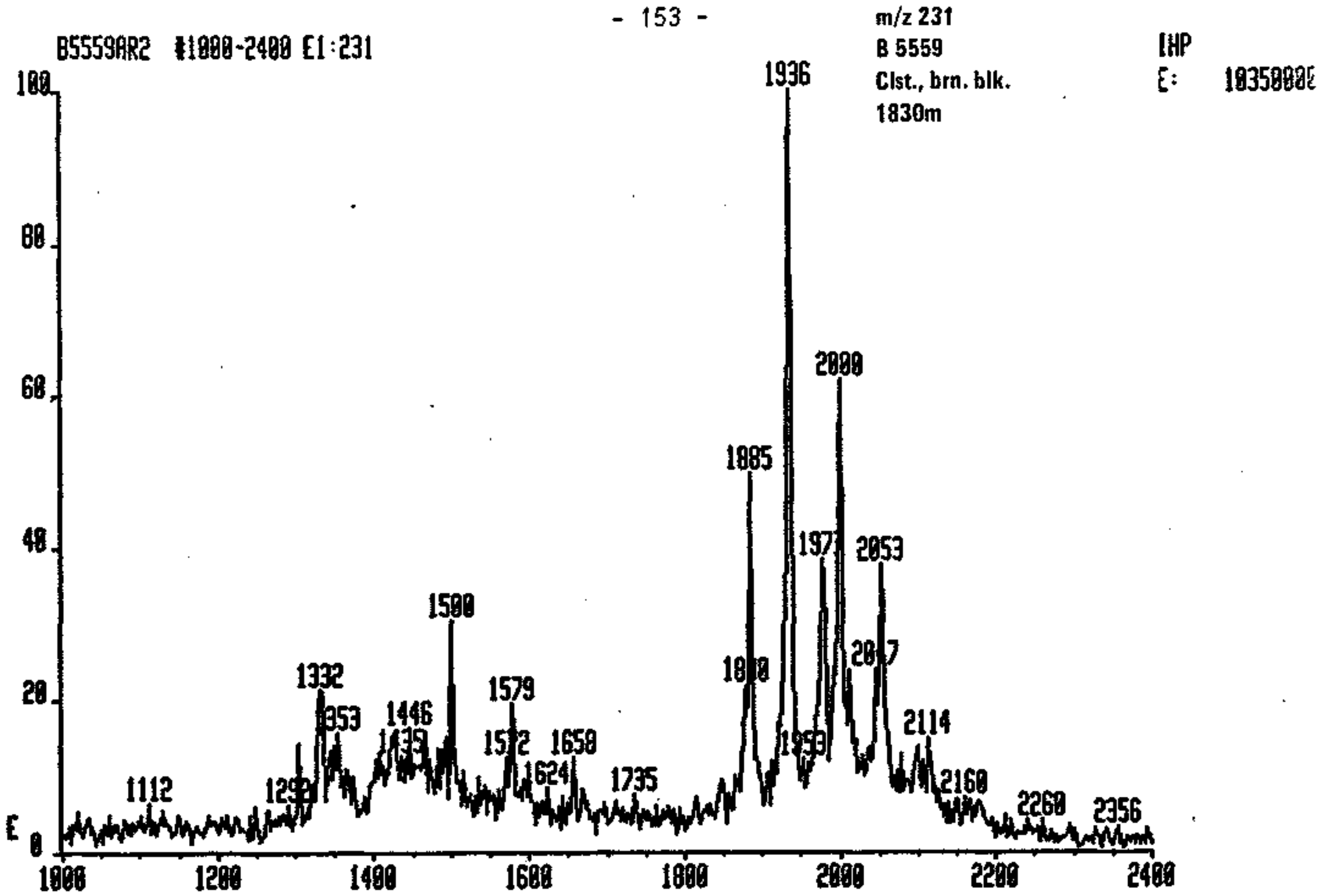
IKU

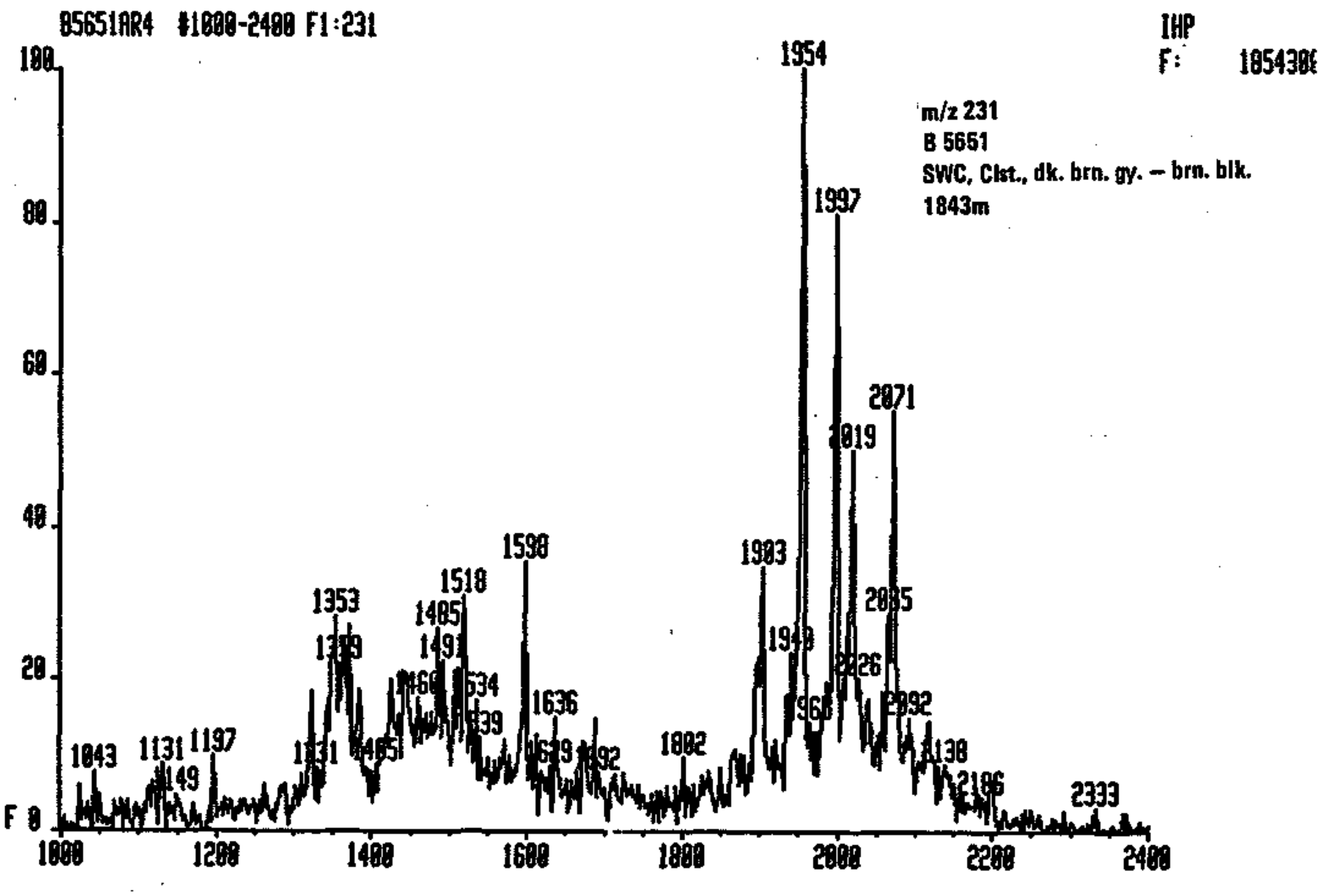

B5566AR #300-1600 TI:202
m/z 202
B 5566
Clst., gy. blk.
1935m
IHP
T: 3905000


B5655AR #300-1600 TI:202
m/z 202
B 5655
SWC, Clst., brn. blk.
1968.50m
IHP
T: 3503000

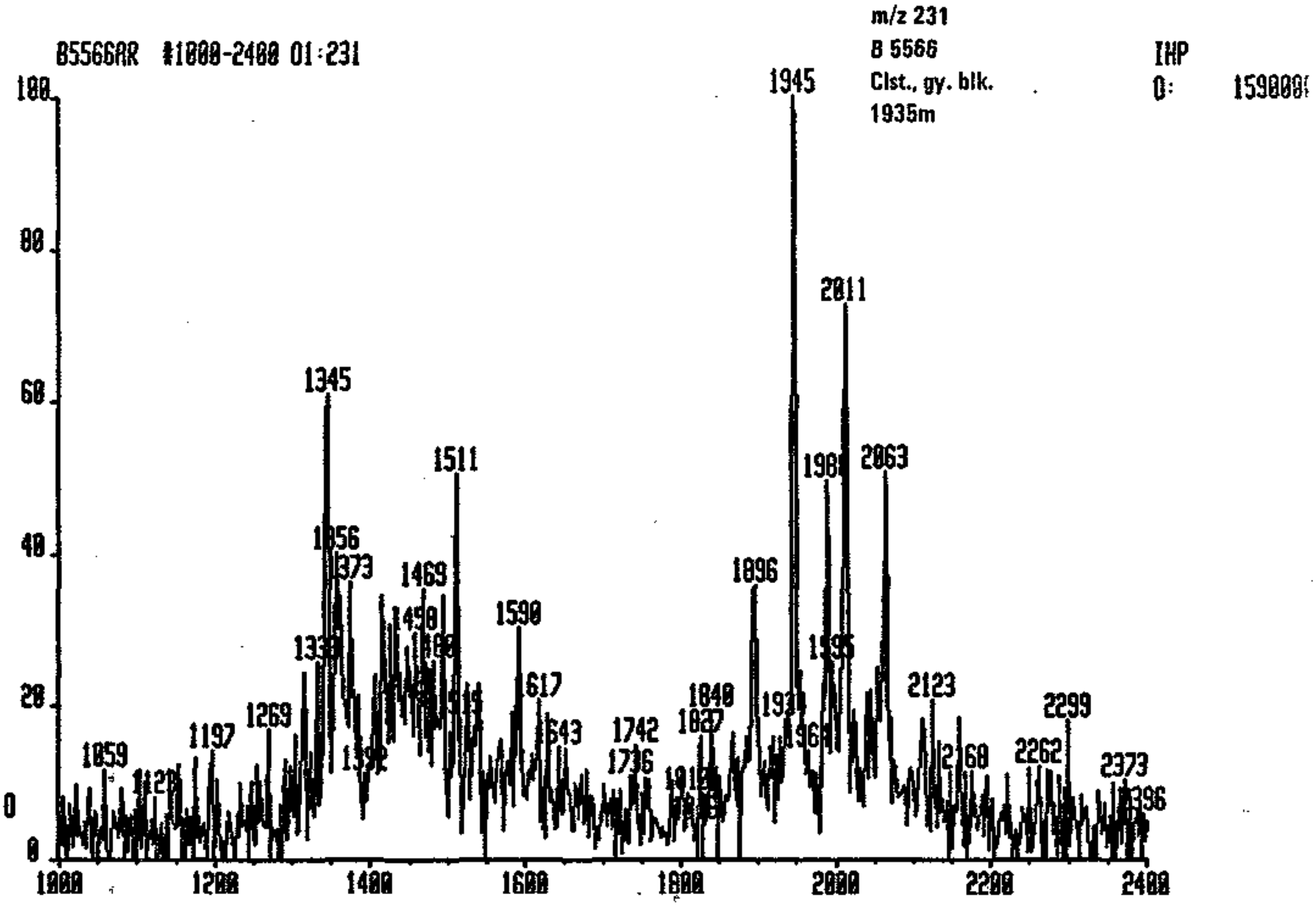
IKU


B5576AR #300-1600 TI:202
IHP
T: 7297800
m/z 202
B 5576
Cist., (med.) dk. gy. – brn. gy.
2085m
1078
1203
1144
1158
1257
1330
962
1127
1344
1435
1510
1588
1216
1389
1069
658
700
743
0
20
40
60
80
100
400
600
800
1000
1200
1400
1600

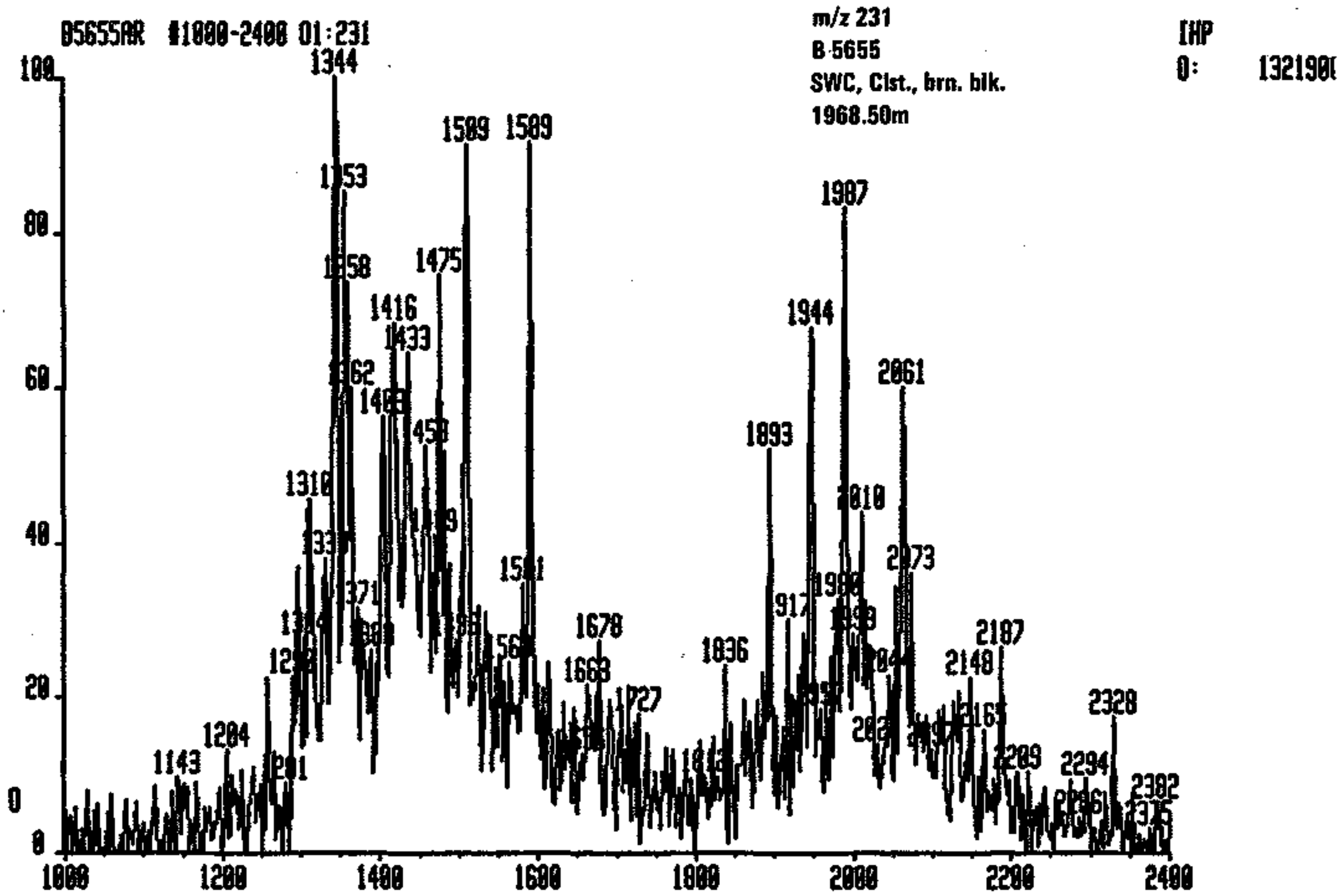

m/z 231
B 5559
Clst., brn. blk.
1830m
B5559AR2 #1000-2400 E1:231
IHP
E: 10350000
1936
2000
1885
1971
2053
1500
1332
1579
2114
1446
1650
1624
1735
1112
2160
2260
2356


B5651AR4 #1000-2400 F1:231
IHP
F: 1054300
m/z 231
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
1954
1997
2071
1598
1903
1518
1353
1485
1636
1802
1043
1131
1197
2138
2333

IKU

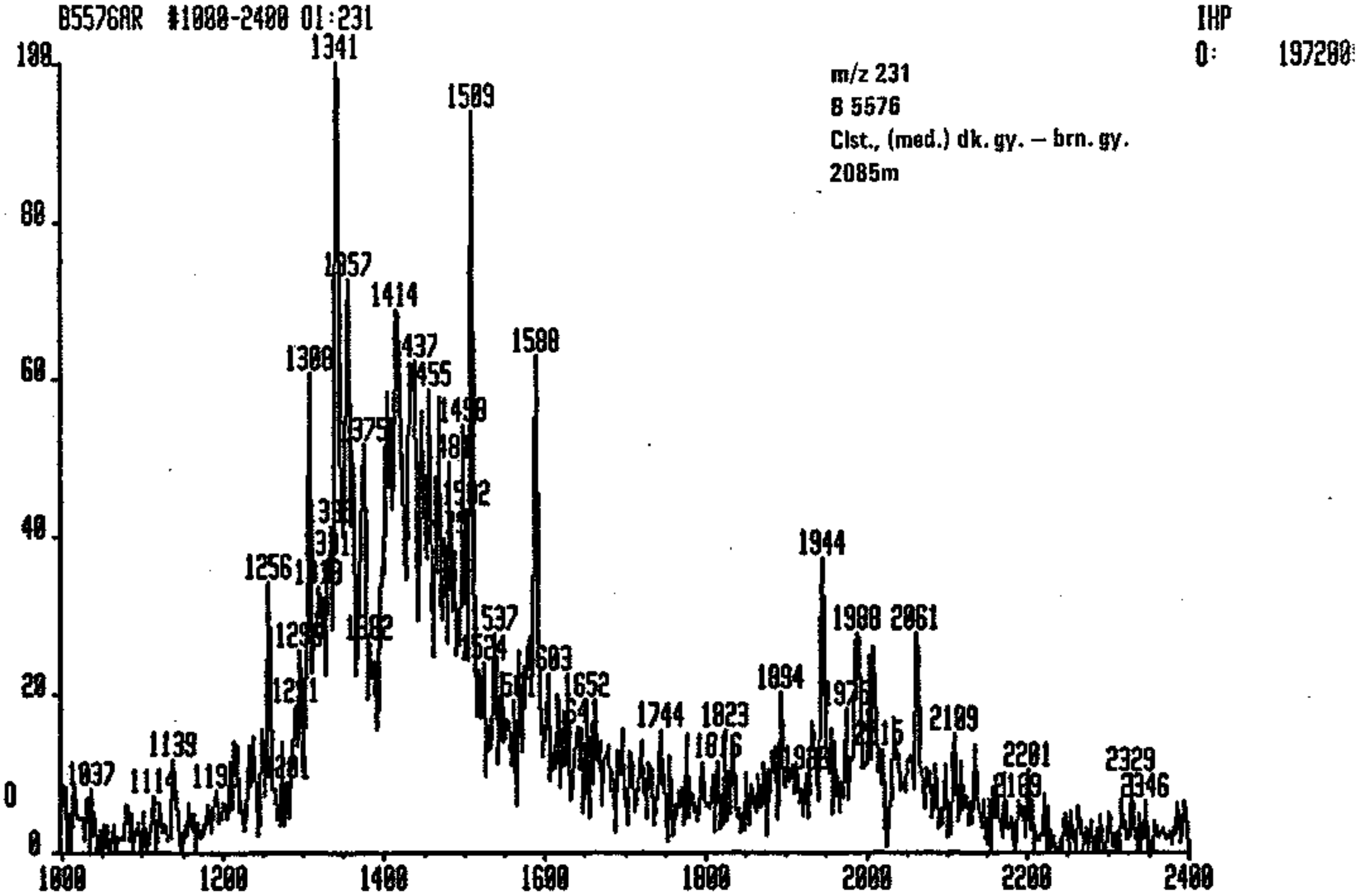


B5566AR #1000-2400 01:231
m/z 231
B 5566
Clst., gy. blk.
1935m
IHP
0: 159000
1945
2011
1345
1511
1981
2063
1356
1373
1469
1896
1490
1590
1617
2123
1840
2299
1197
1269
1643
1742
1827
1059
1736
2262
2373
2396
1000
1200
1400
1600
1800
2000
2200
2400

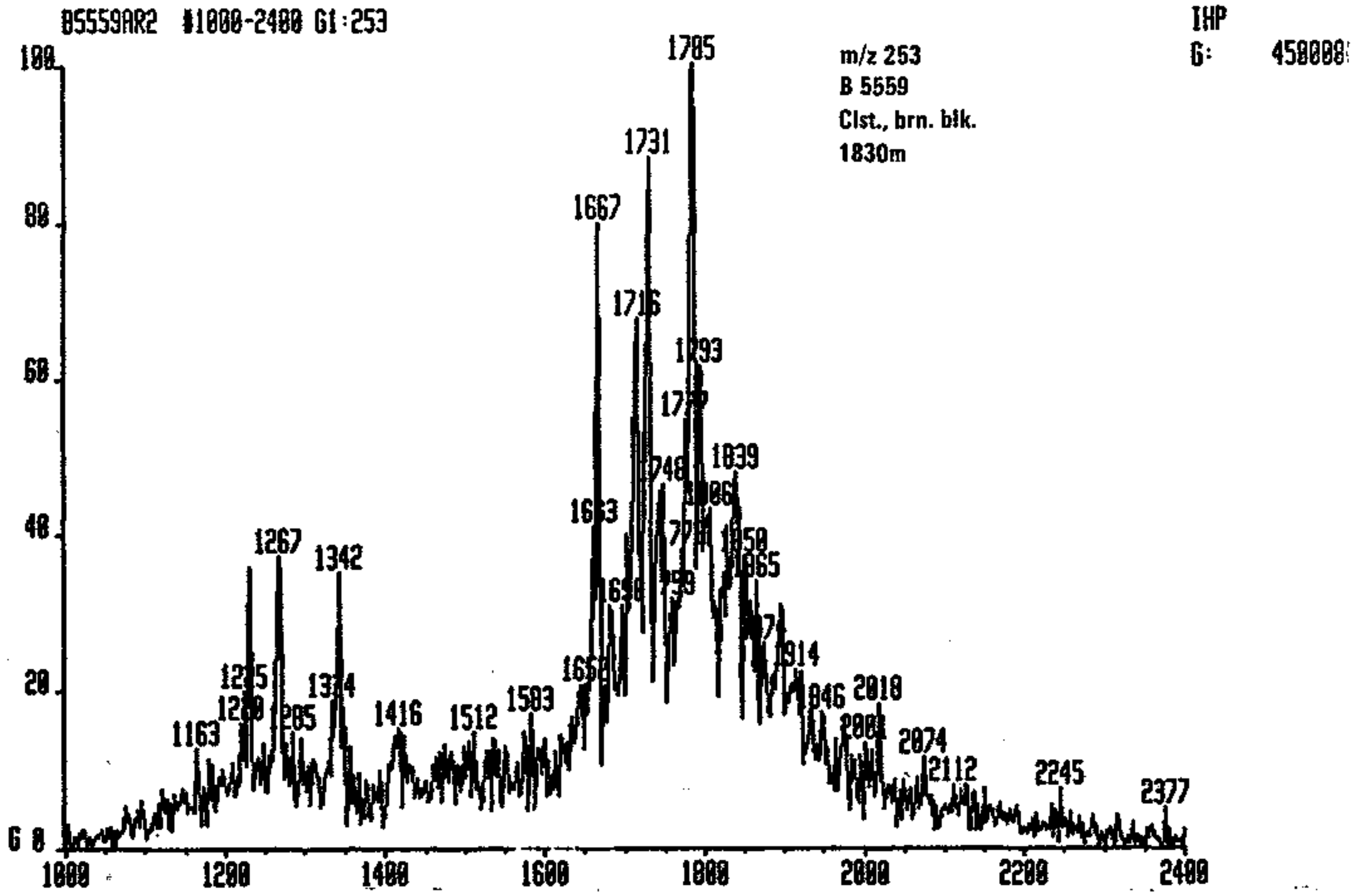


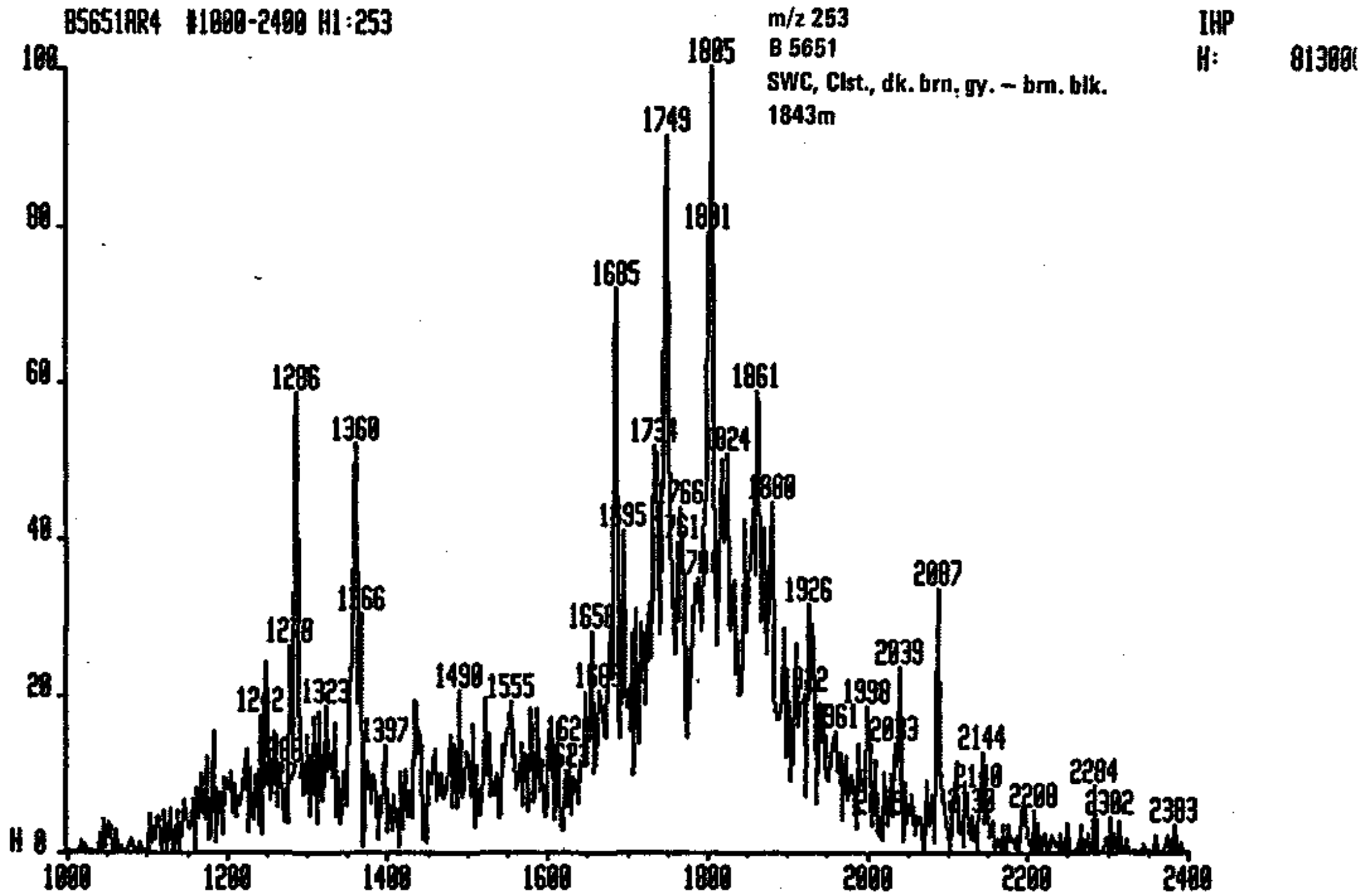
B5655AR #1000-2400 01:231
m/z 231
B 5655
SWC, Clst., brn. blk.
1968.50m
IHP
0: 132190
1344
1509
1589
1353
1987
1358
1475
1416
1944
1433
2061
1362
1893
1310
2010
2073
1678
2187
1836
2148
1663
1727
2328
1204
1143
2294
2382
1000
1200
1400
1600
1800
2000
2200
2400

IKU

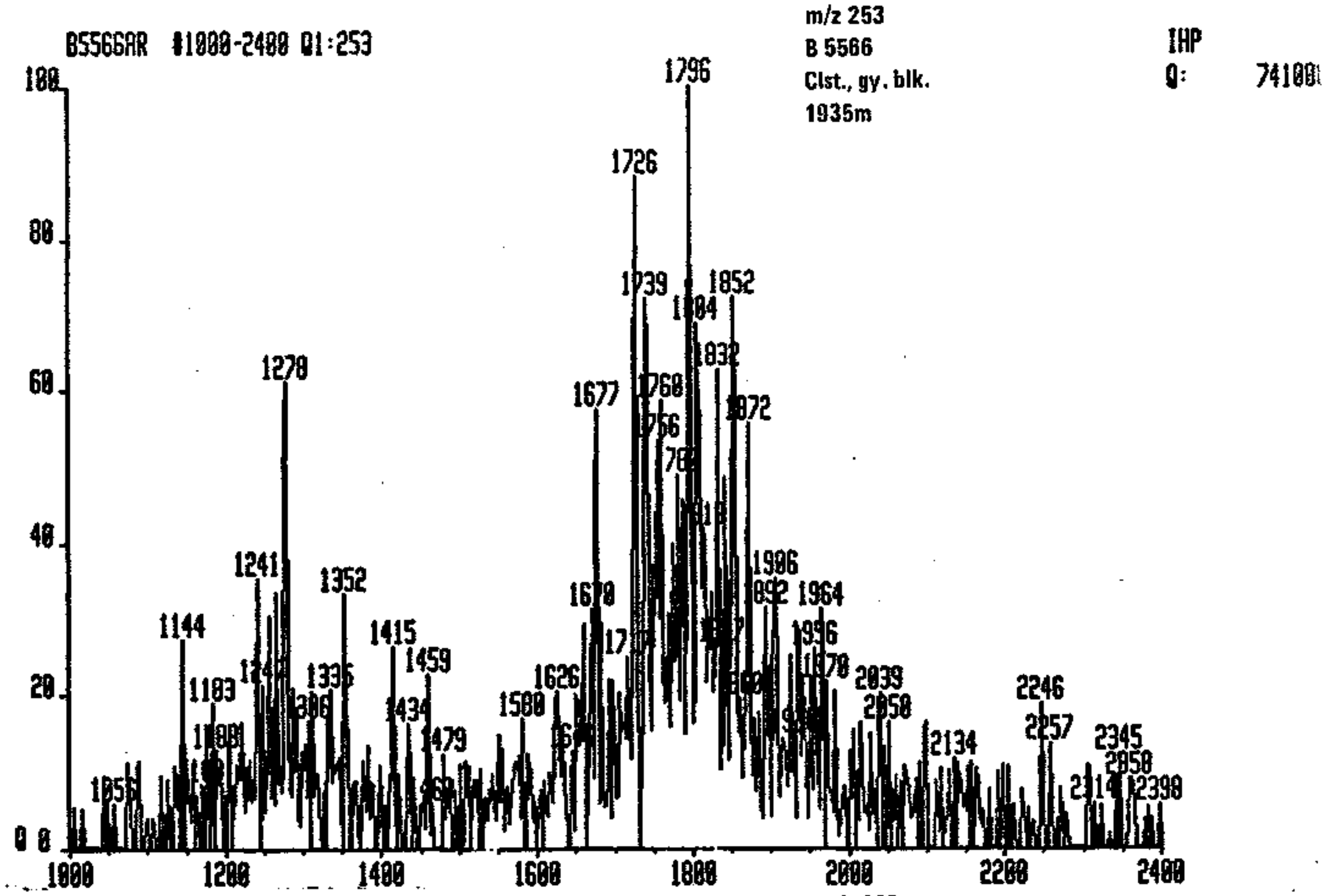

B5576AR #1000-2400 01:231
IHP
0: 197200
m/z 231
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
1341
1509
1357
1414
1437
1455
1300
1588
1256
1944
1988
2061
1894
1744
1823
2109
2201
2329
2346
1139
1037
1114
1652
1603
1537
1000
1200
1400
1600
1800
2000
2200
2400
100
80
60
40
20
0

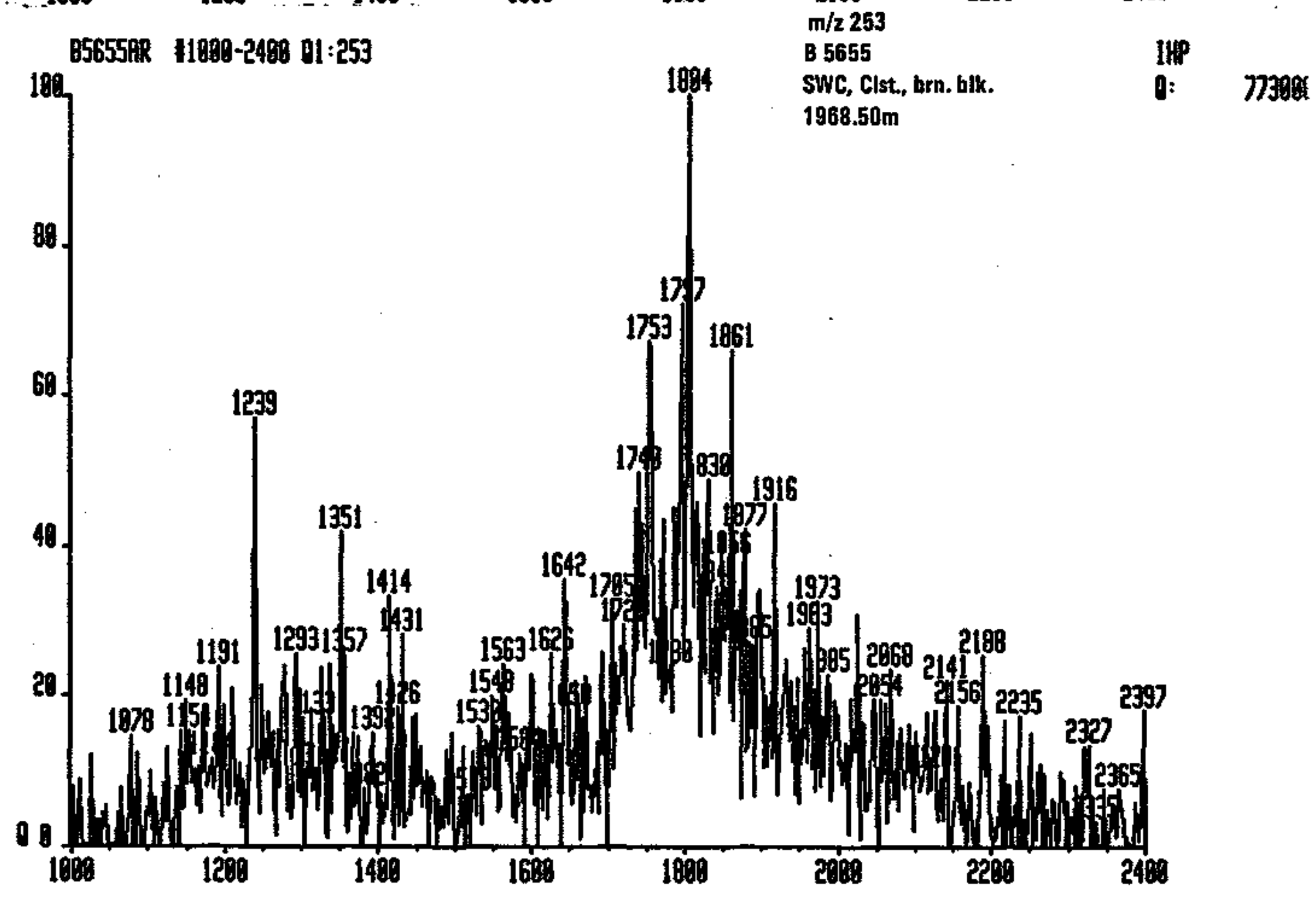
IKU


B5559AR2 #1000-2400 G1:253
IHP
G: 458008
m/z 253
B 5559
Clst., brn. blk.
1830m
1785
1731
1667
1793
1839
1342
1267
1163
1416
1512
1583
1914
2018
2074
2112
2245
2377
1000
1200
1400
1600
1800
2000
2200
2400


B5651AR4 #1000-2400 H1:253
IHP
m/z 253
B 5651
SWC, Clst., dk. brn. gy. – brn. blk.
1843m
1805
1749
1685
1861
1286
1360
1926
2087
2039
1490
1555
1397
2144
2200
2284
2303
1000
1200
1400
1600
1800
2000
2200
2400

IKU


B5566AR #1000-2400 Q1:253
m/z 253
B 5566
Clst., gy. blk.
1935m
IHP
Q: 74100


B5655AR #1000-2400 Q1:253
m/z 253
B 5655
SWC, Clst., brn. blk.
1968.50m
IHP
Q: 77300

IKU

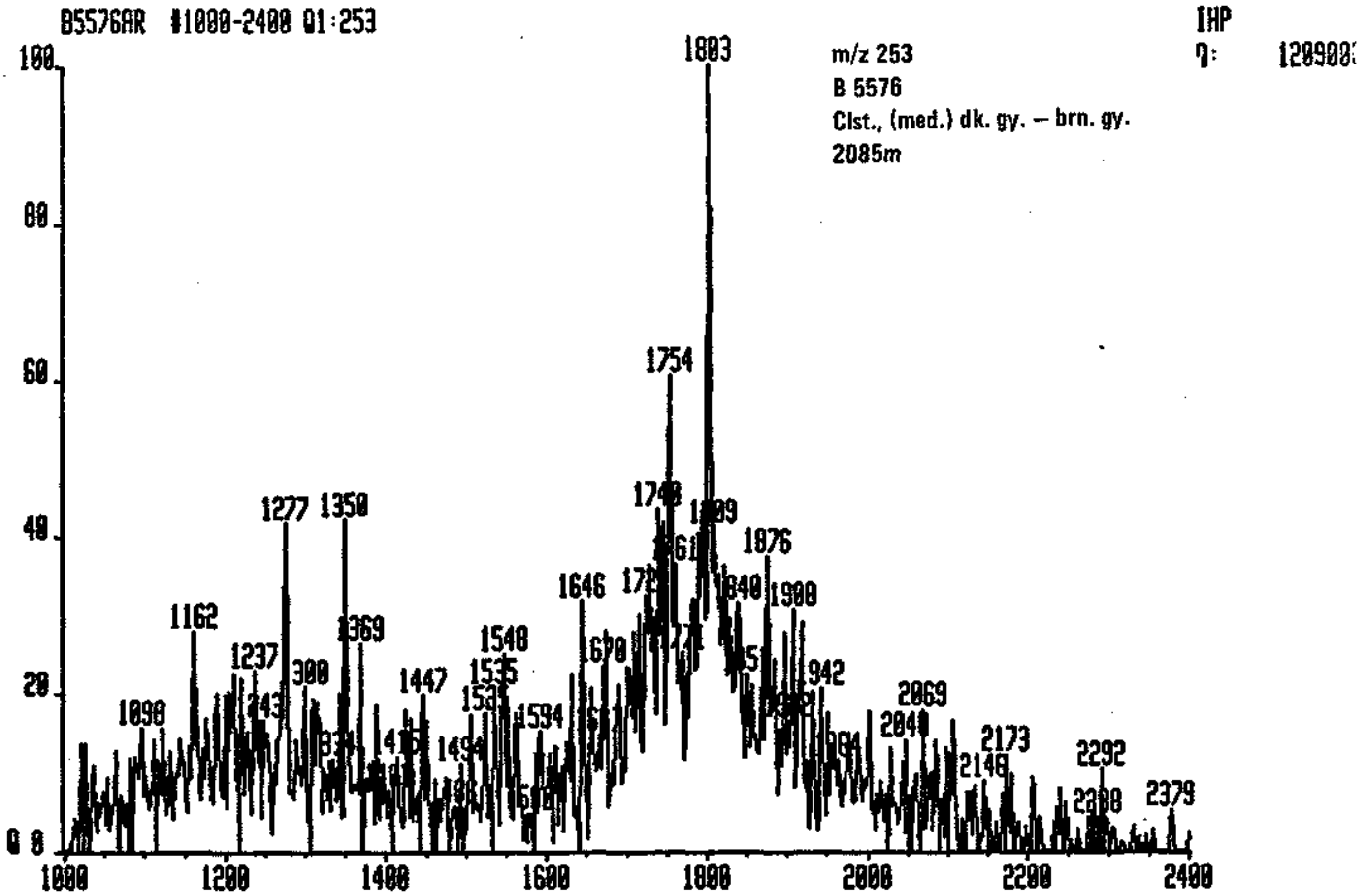
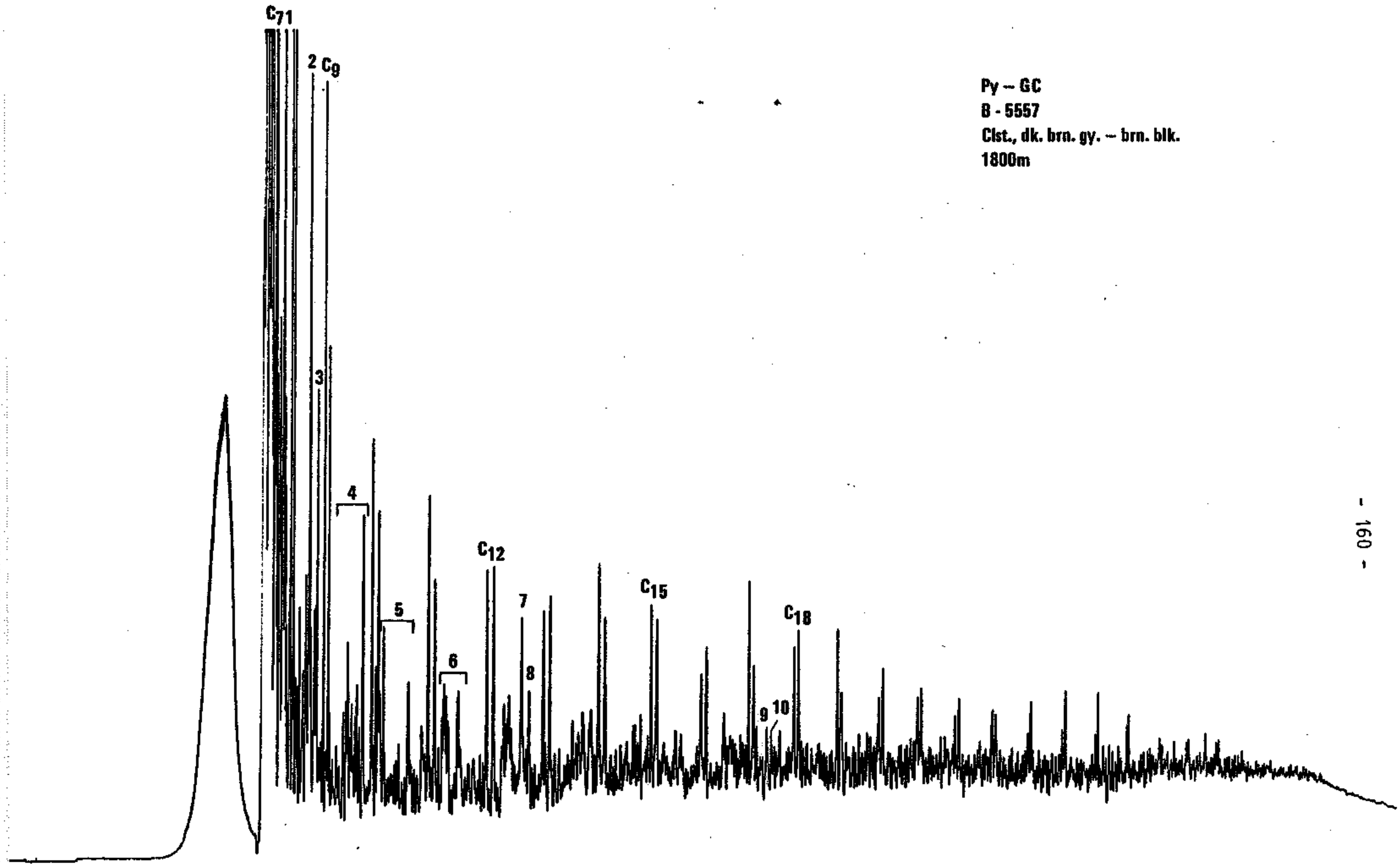
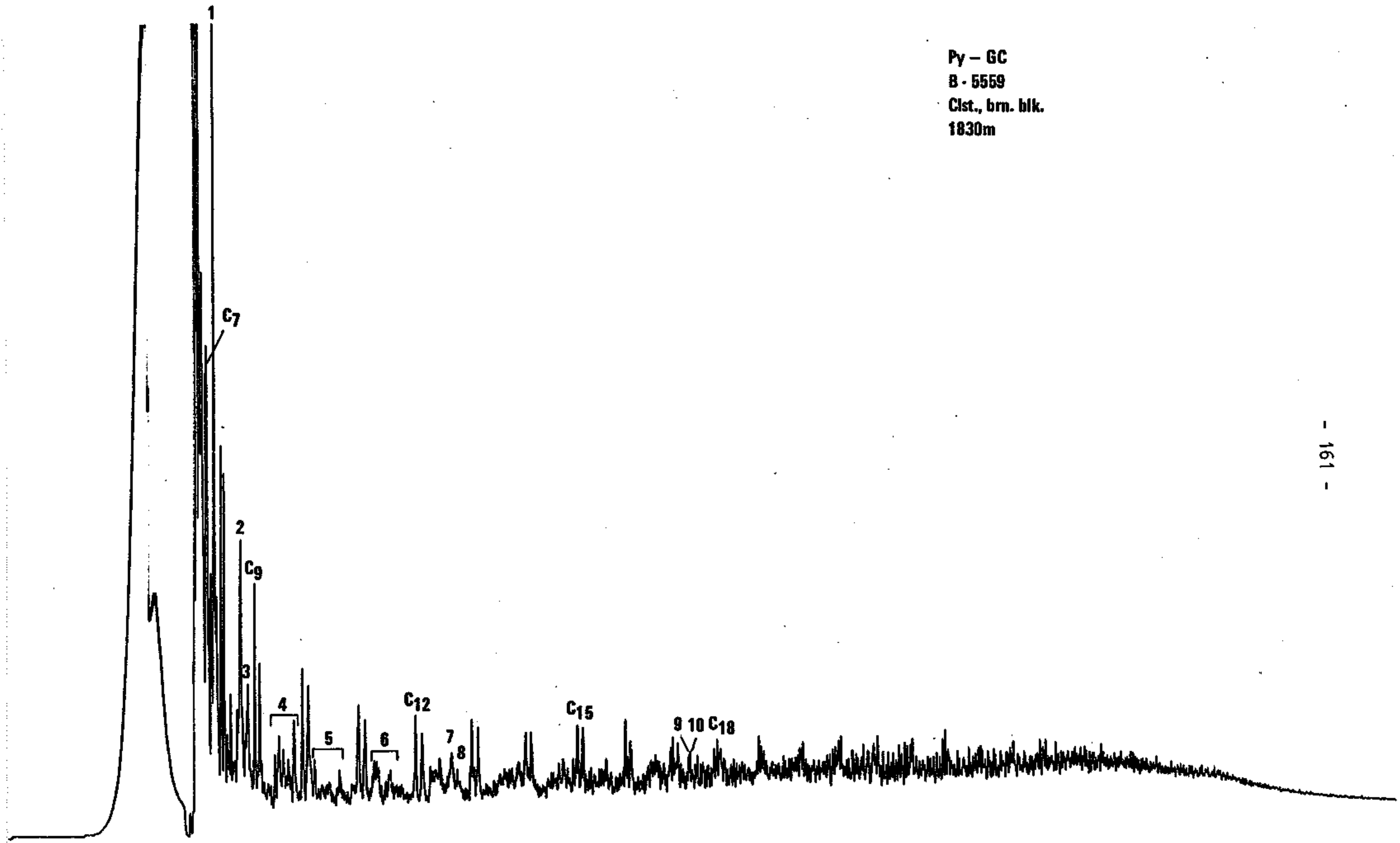

B5576AR #1000-2400 Q1:253
IHP
m/z 253
B 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
1803
1754
1277
1350
1162
1369
1237
1300
1090
1447
1548
1535
1594
1646
1670
1748
1809
1876
1840
1900
1942
2069
2040
2173
2148
2292
2379
1000
1200
1400
1600
1800
2000
2200
2400

FIGURE 5

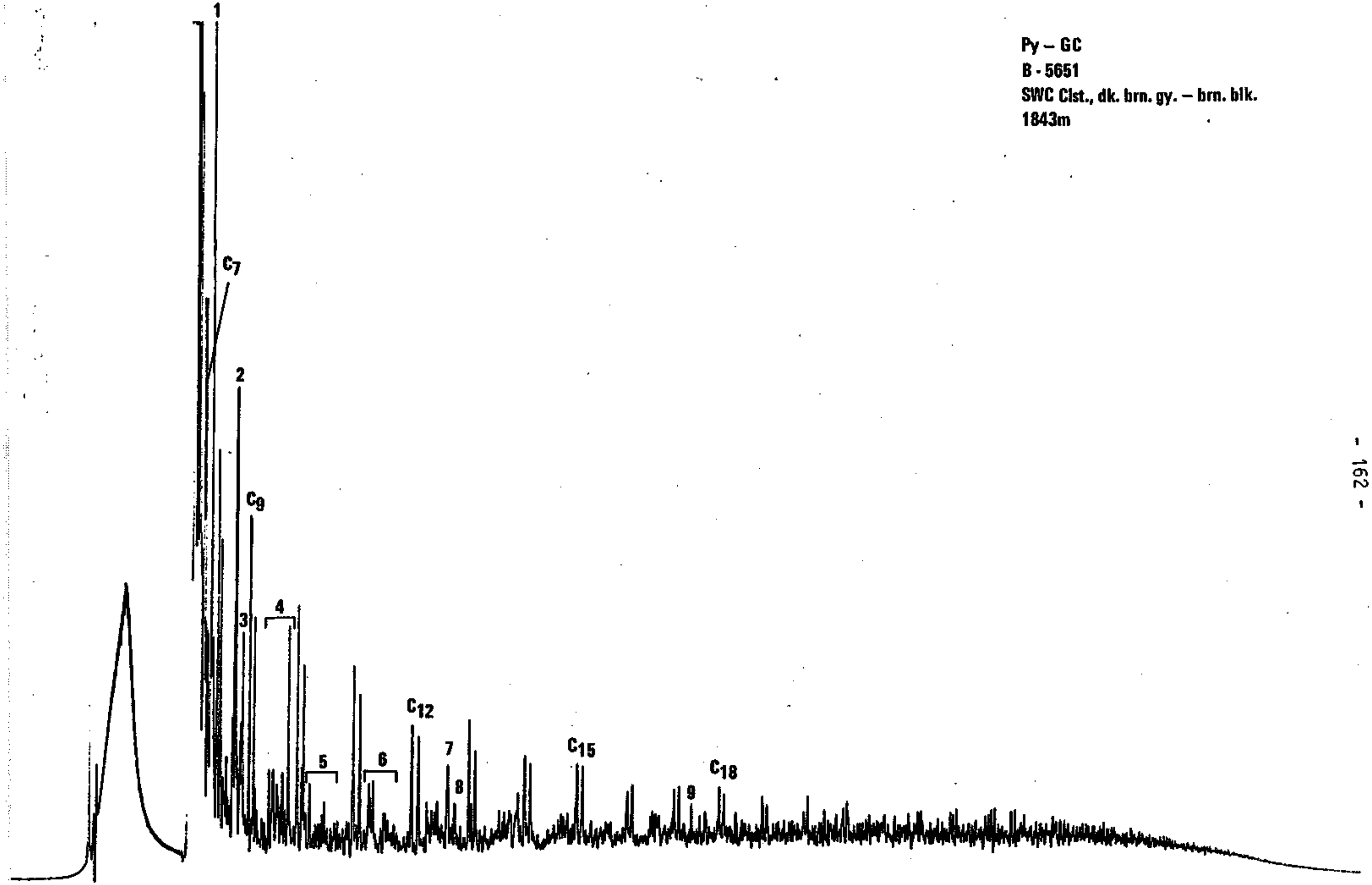
Pyrolysis gas chromatograms

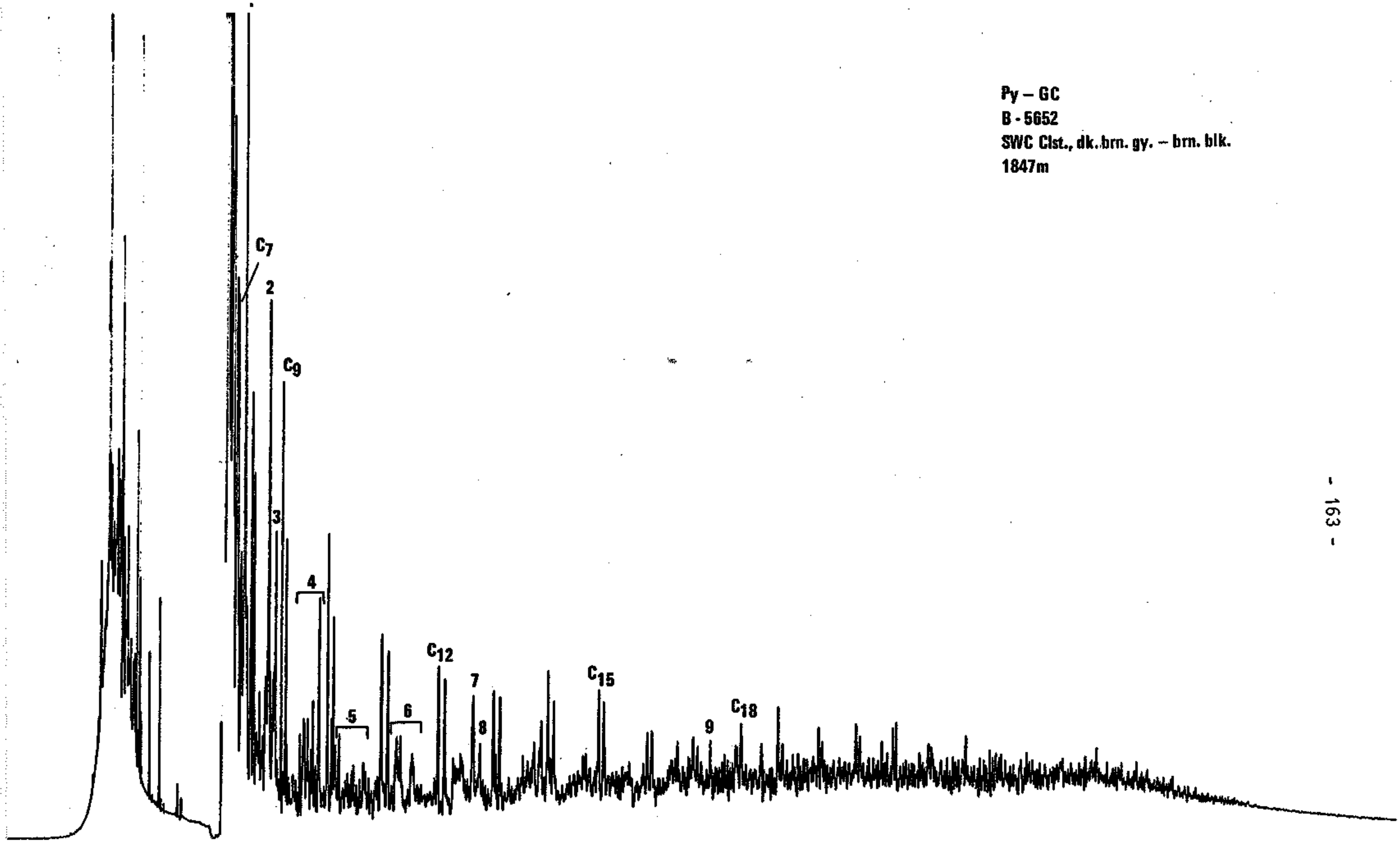
1	-	toluene
2	-	(m+p)-xylenes
3	-	o-xylene
4	-	C_3-alkylbenzenes + phenol (P)
5	-	C_4-alkylbenzenes + methylphenols (C_1P)
6	-	C_4- and C_5-alkylbenzenes + naphthalene
7	-	2-methylnaphthalene
8	-	1-methylnaphthalene
9	-	prist-1-ene
10	-	prist-2-ene

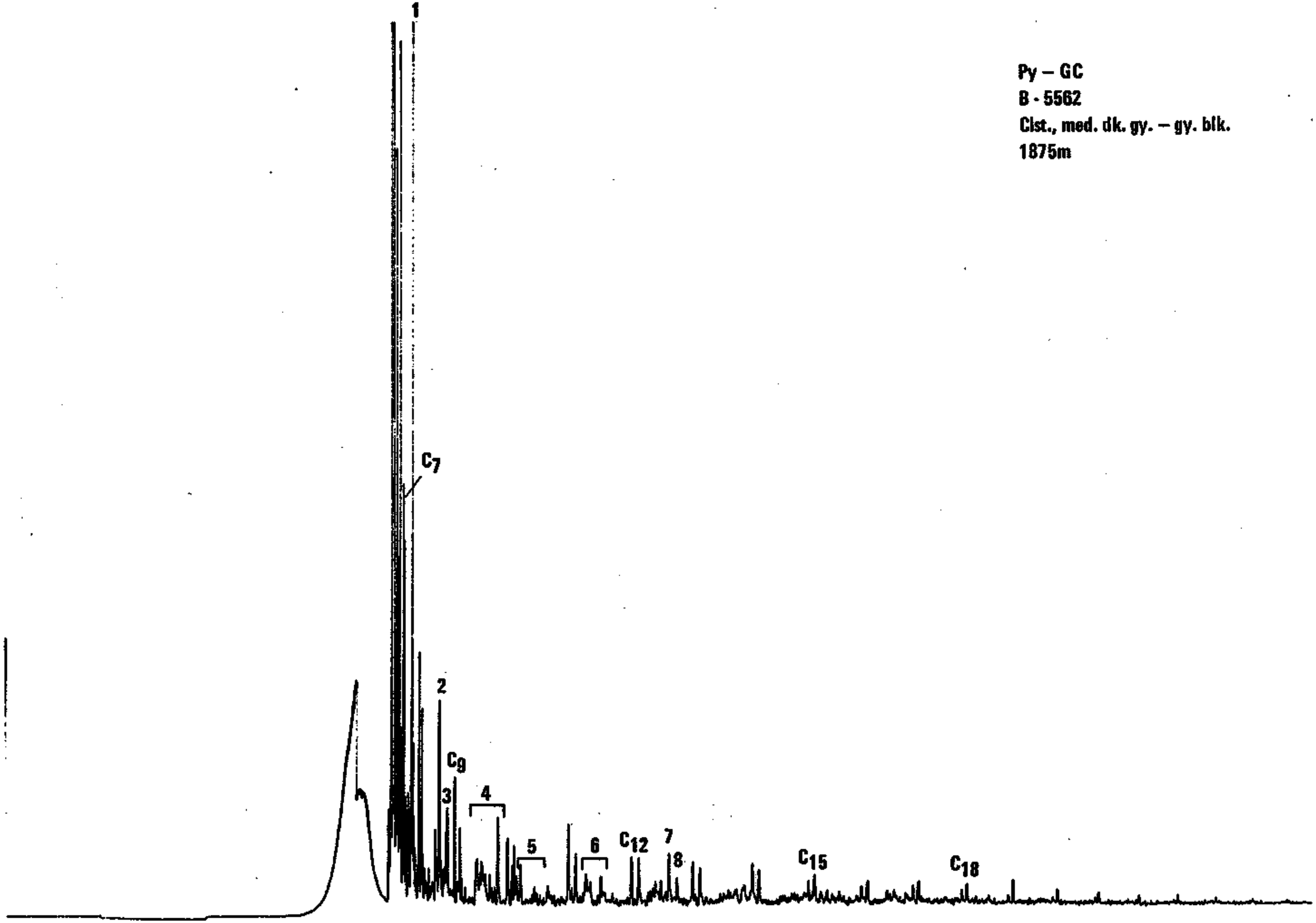

Py – GC
B - 5557
Clst., dk. brn. gy. – brn. blk.
1800m
C_7
1
2
C_9
3
4
5
6
C_{12}
7
8
C_{15}
9
10
C_{18}

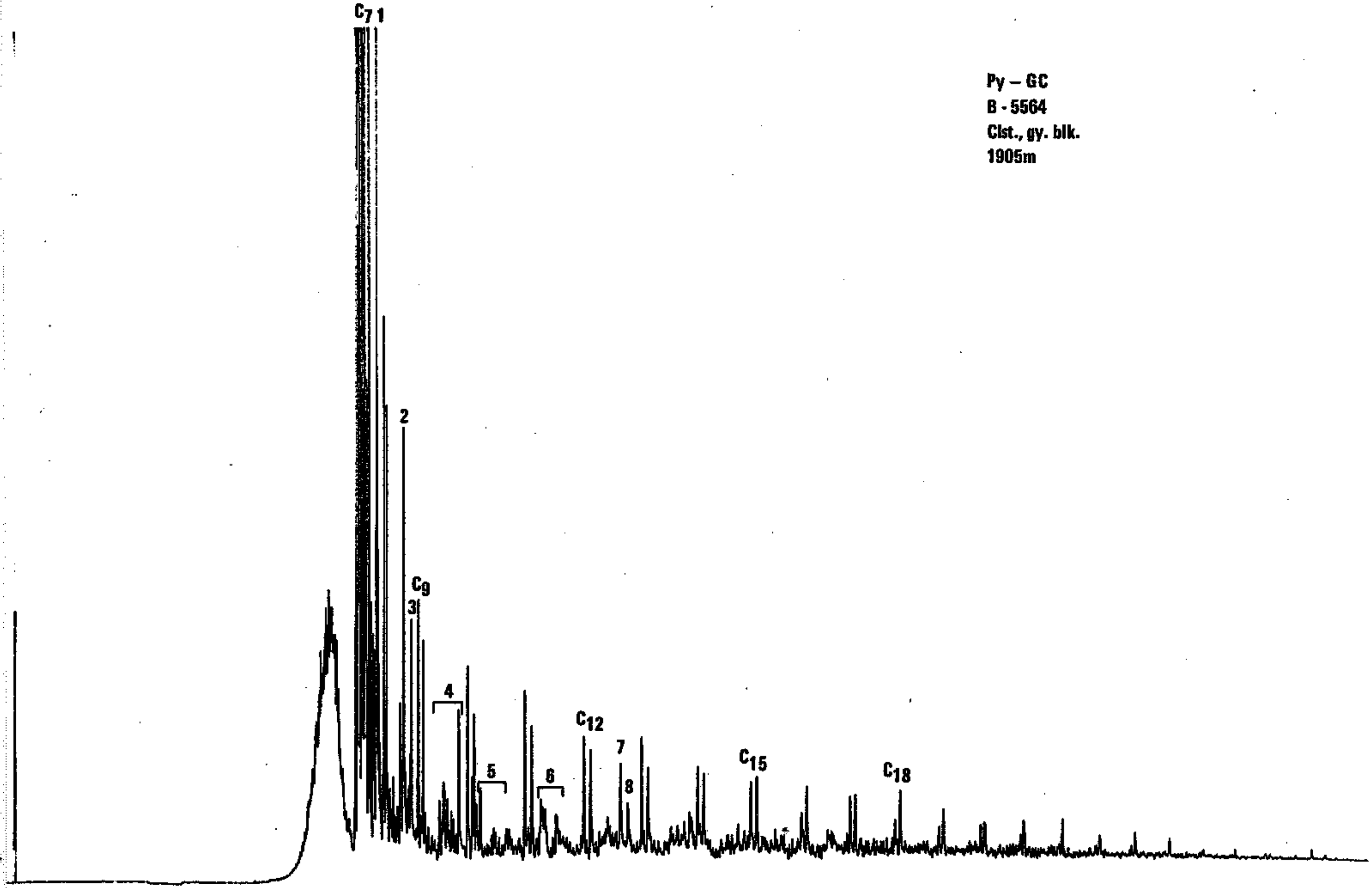

Py – GC
B - 5559
Clst., brn. blk.
1830m
1
C7
2
C9
3
4
5
6
C12
7
8
C15
9
10
C18

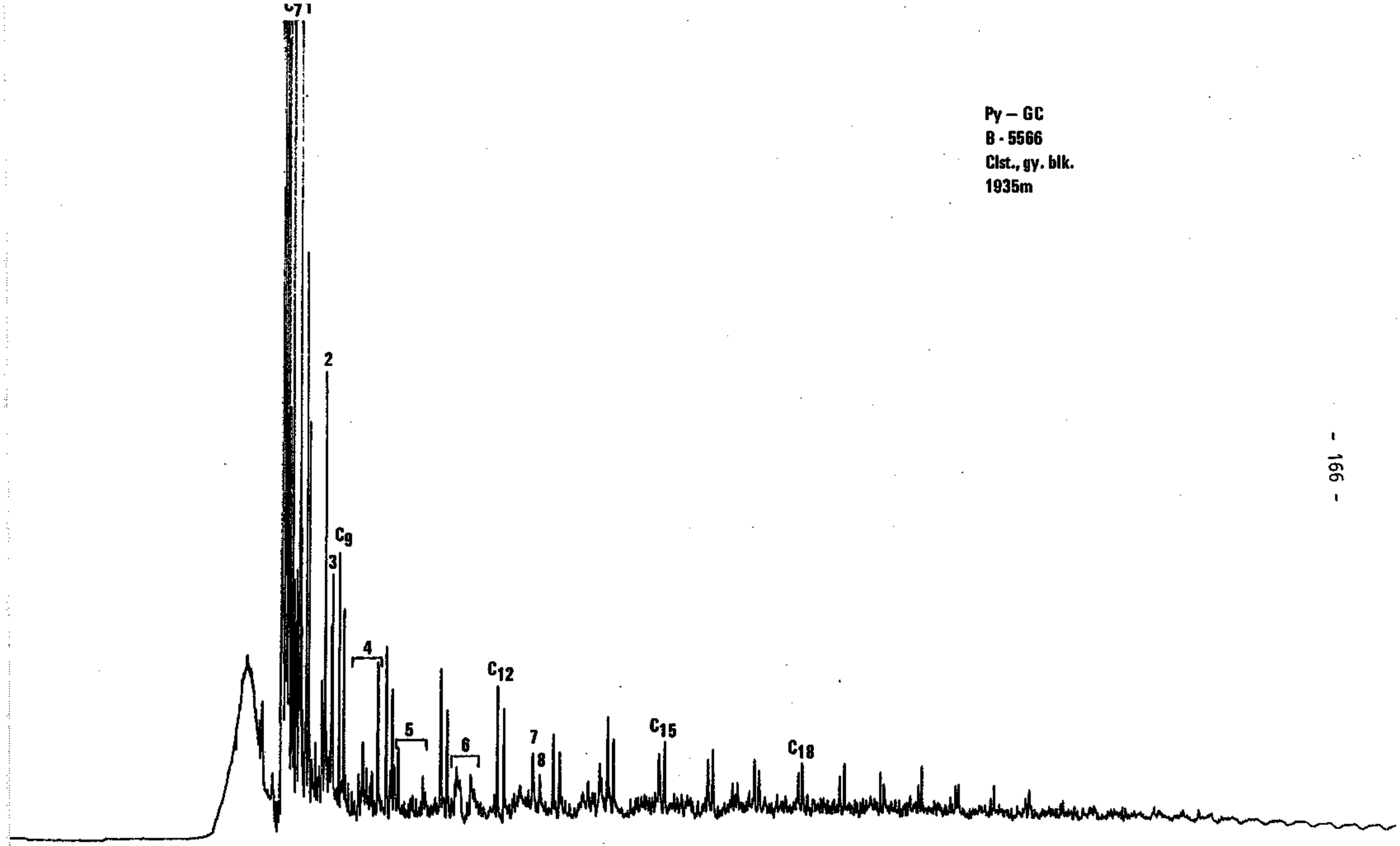
Py – GC
B - 5651
SWC Clst., dk. brn. gy. – brn. blk.
1843m

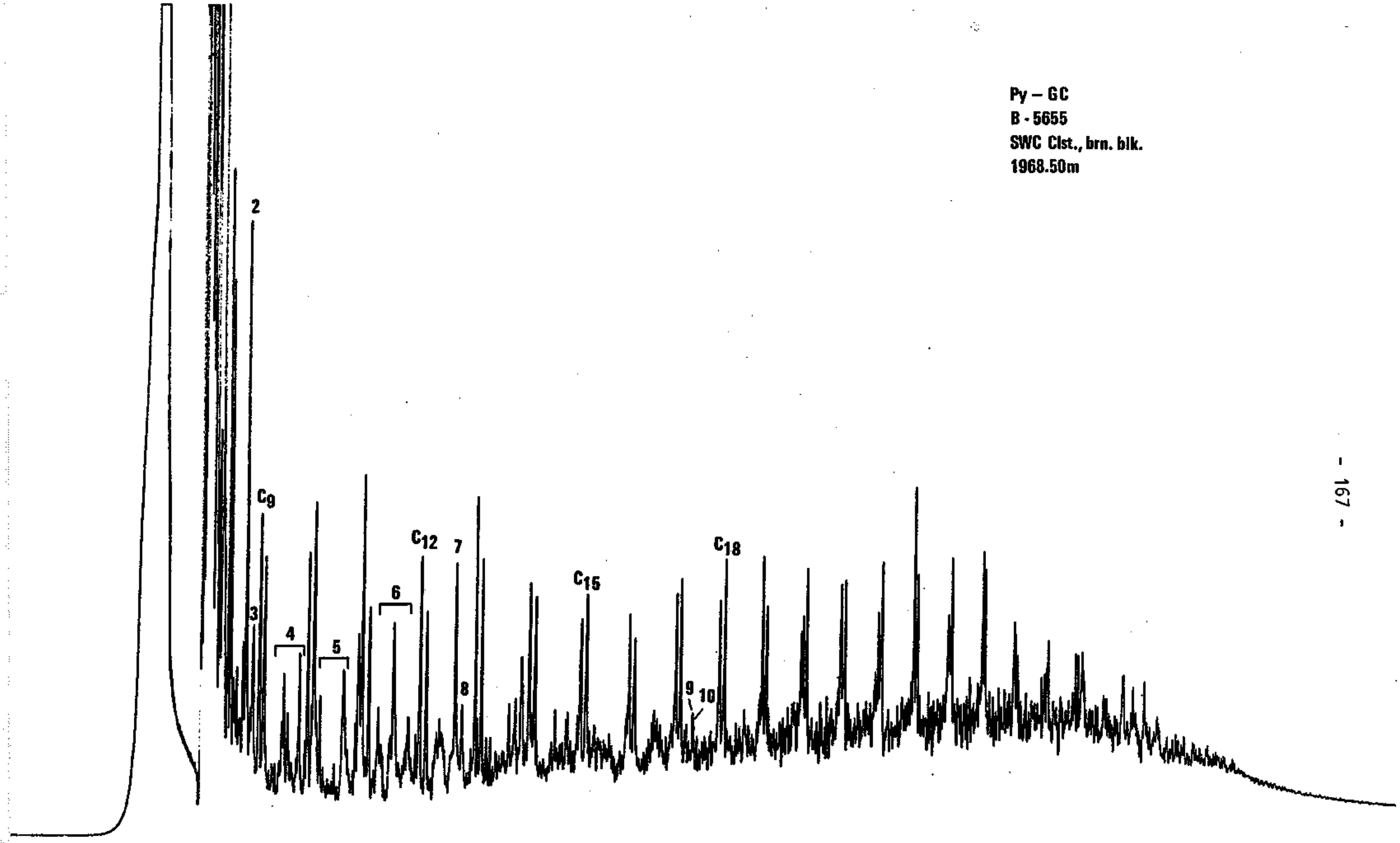


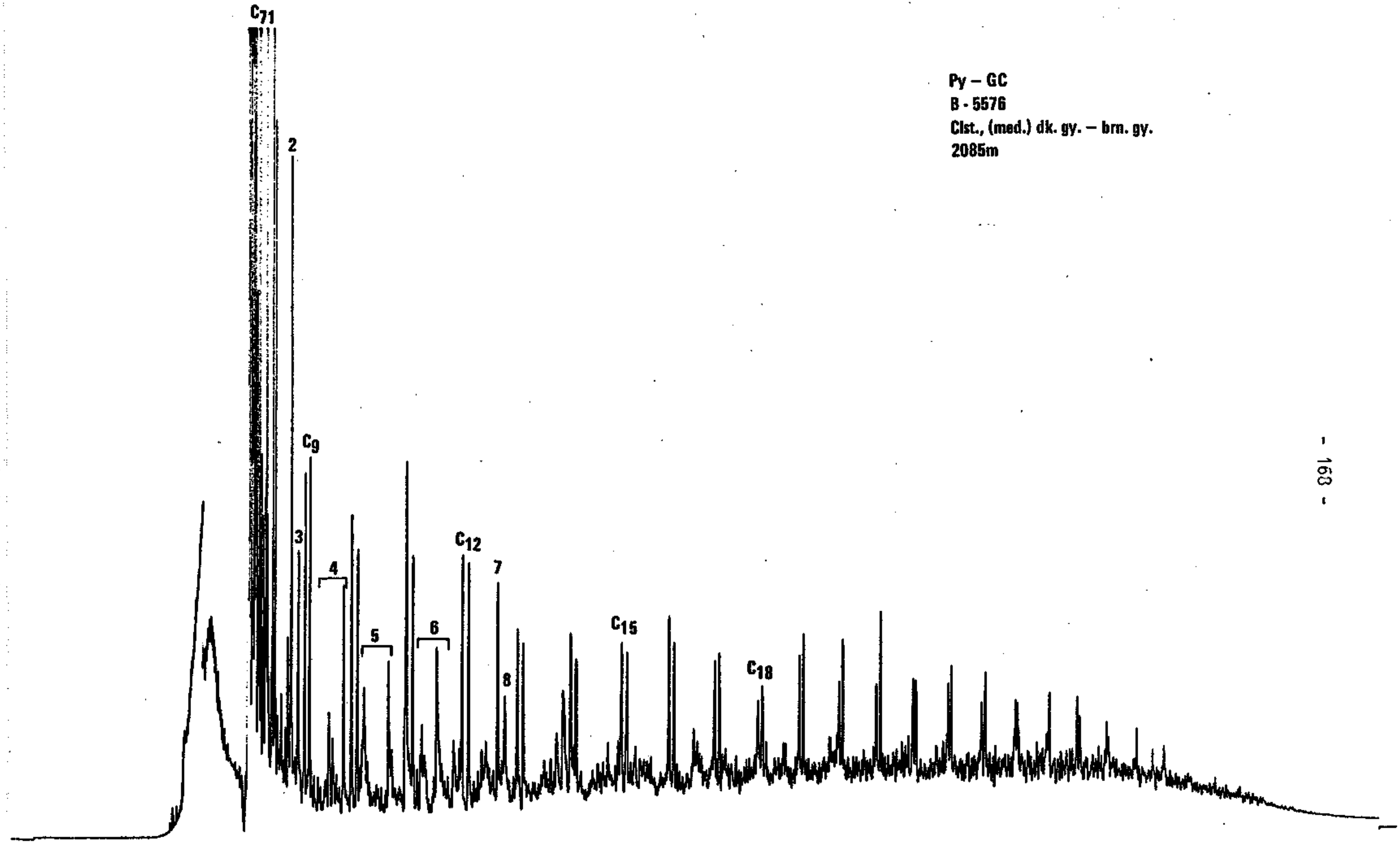

Py – GC
B - 5652
SWC Clst., dk. brn. gy. – brn. blk.
1847m
C7
2
C9
3
4
5
6
C12
7
8
C15
9
C18


Py – GC
B - 5562
Clst., med. dk. gy. – gy. blk.
1875m
1
C_7
2
C_9
3
4
5
6
C_{12}
7
8
C_{15}
C_{18}


Py – GC
B - 5564
Clst., gy. blk.
1905m
C7
1
2
C9
3
4
5
6
C12
7
8
C15
C18


Py – GC
B - 5566
Clst., gy. blk.
1935m
C7 1
2
C9
3
4
5
6
C12
7
8
C15
C18


Py – GC
B - 5655
SWC Clst., brn. blk.
1968.50m
2
3
4
5
6
7
8
9
10
C9
C12
C15
C18


Py – GC
B - 5576
Clst., (med.) dk. gy. – brn. gy.
2085m
C7 1
2
C9
3
4
5
6
C12
7
8
C15
C18

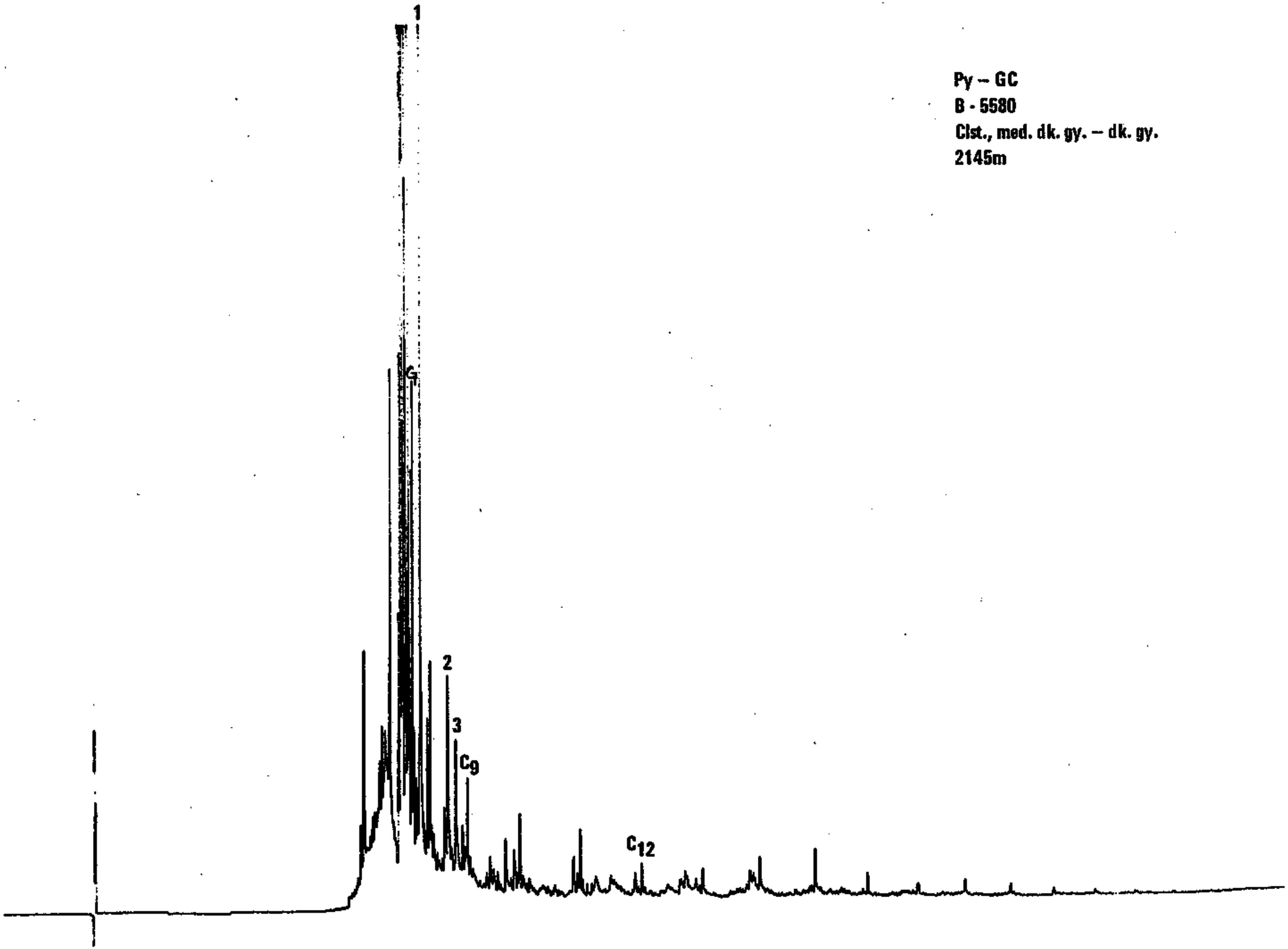

Py – GC
B - 5580
Clst., med. dk. gy. – dk. gy.
2145m
1
C7
2
3
C9
C12

FIGURE 6

VITRINITE REFLECTANCE HISTOGRAMS

Key:-	A	=	Grey-black-brown claystone. Lower case letter is used when there is some uncertainty about whether the value is representative.
	PP	=	Primary population Y = Relevant population considered reasonably representative. N = Not representative (caving, reworked, contaminant, drilling effects).
	LOW+ HIGH	=	Population limits
	# VAL.	=	Number of measurements in that population.

Lithology cross-reference table

A = Clst. gy
B = Clst. dk gy
C = Clst. gn
D = Clst. bn
E = Clst. rd
F = Clst. calc.
G = Clst. carb.
H = Shale
I = Sandstone
J = Limestone
K = Coal
L = Lignite
M = Carbargillite
N = Siltstone
O = Bit
P = X

a,b etc. = same lithology as above but value not included in any population, possibly because suspected caving, reworking, contamination or other erroneous recordings.

```
# B 5607   850.0M 7121/7-1
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!                            jj
-+-------+-------+-------+-------+-------+-------+-------+-------+-------+-------+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
       OVERALL  2 1.17 0.04

ERED VALUES FOLLOW:

14j 1.19j
```

B 5609   909.0M 7121/7-1

```
|
|
|
|
|
|
|
|
|
|
|
|
|
|
|
-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
```

LOW HIGH LIT #VAL MEAN STDV
OVERALL 0 0.00 0.00

ERED VALUES FOLLOW:

! B 5611   950.5M 7121/7-1

```
!
:
!
!
!
!
!
!
!
!
!
!
!
!                         j    j  j
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
```

LOW HIGH LIT #VAL MEAN STDV
       OVERALL 3 1.43 0.18

ERED VALUES FOLLOW:

24j 1.45j 1.60j

```
# B 5613  1004.0M 7121/7-1
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!      d
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
       OVERALL  1 0.28 0.00

ERED VALUES FOLLOW:

28d
```

```
# B 5615  1050.0M 7121/7-1
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!                   a
-+----+----+----+----+----+----+----+----+----+----+----
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
     OVERALL  1 1.19 0.00

ERED VALUES FOLLOW:

19a
```

```
# B 5617  1128.0M 7121/7-1
!
!
!
!
!
!
!
!
!
!
!
!
!
!                 a
!                aaa  a     a
!        AAD  aaaa  aa    a
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
.40 0.53 ALL    3 0.46 0.06
.67 0.84 ALL    8 0.76 0.05
       OVERALL 16 0.80 0.23

ERED VALUES FOLLOW:

40A 0.47A 0.52D 0.67a 0.73a 0.74a 0.76a 0.77a 0.79a 0.82a 0.83a 0.95a 0.95a
02a 1.20a 1.21a
```

```
# B 5619  1171.0M 7121/7-1
 !
-!
 !
-!
 !
-!
 !
-!
 !
-!
 !
-!
 !
-!
 !           A     a a
--+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

 LOW HIGH LIT #VAL MEAN STDV
).60 0.61 ALL     1 0.60 0.00
       OVERALL  3 0.85 0.23

)ERED VALUES FOLLOW:

.60A 0.91a 1.04a
```

```
# B 5621  1225.0M 7121/7-1
|
|
|
|
|
|
|
|
|
|
|
|
|
|
|                         j
-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
       OVERALL  1 1.00 0.00

ERED VALUES FOLLOW:

00j
```

```
|# B 5623  1275.0M 7121/7-1
 |
-|
 |
-|
 |
-|
 |
-|
 |
-|
 |
-|
 |                  a a
-|          A AA    a a
 |          AAAAAaaa aaaa  a
--+----+----+----+----+----+----+----+----+----+----+---
 0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

 LOW HIGH LIT #VAL MEAN STDV
).55 0.76 ALL    8 0.66 0.07
       OVERALL 20 0.87 0.21

)ERED VALUES FOLLOW:

.55A 0.59A 0.62A 0.66A 0.68A 0.70A 0.72A 0.75A 0.84a 0.86a 0.90a 0.92a 0.94a
.00a 1.02a 1.03a 1.08a 1.12a 1.19a 1.32a
```

```
# B 5625  1327.DM 7121/7-1
 !
 !
 !
 !
 !
 !
 !
 !
 !
 !
 !
 !
 !
 !
 !       a    A A AA
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

 LOW HIGH LIT #VAL MEAN STDV
).54 0.77 ALL     4 0.66 0.09
        OVERALL  5 0.59 0.18

)ERED VALUES FOLLOW:

.30a 0.54A 0.63A 0.70A 0.76A
```

```
## B 5628  1435.0M 7121/7-1
 |
·|
 |
·|
 |
·|
 |
·|
 |
·|
 |
·|
 |
·|              a
 |           J  aa  a   a  a
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
```

LOW	HIGH	LIT	#VAL	MEAN	STDV
].62	0.63	ALL	1	0.62	0.00
		OVERALL	7	0.96	0.26

)ERED VALUES FOLLOW:

.62J 0.81a 0.82a 0.87a 1.00a 1.24a 1.35a

```
# B 5630  1480.0M 7121/7-1
|
|
|
|
|
|
|
|
|
|
|
|
|
|
|
-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
       OVERALL  0 0.00 0.00

ERED VALUES FOLLOW:
```

```
# B 5632  1540.0M 7121/7-1
!
!
!
!
!
!
!
!
!
!
!
!
!
!           A
!           A    aa aa   a a
-+----+----+----+----+----+----+----+----+----+----+----+--
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
.56 0.58 ALL     2 0.56 0.01
       OVERALL   8 0.91 0.27

ERED VALUES FOLLOW:

56A 0.57A 0.80a 0.85a 0.97a 1.01a 1.21a 1.32a
```

```
## B 5633  1576.0M 7121/7-1
 !
-!
 !
-!
 !
-!
 !
-!
 !
-!
 !
-!
 !
-!
 !                          aa
--+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+---
 0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

 LOW HIGH LIT #VAL MEAN STDV
1.05 1.14 ALL     1 1.05 0.00
        OVERALL  2 1.10 0.06

ORDERED VALUES FOLLOW:

1.05a 1.14a
```

```
* B 5635  1642.0M 7121/7-1
!
!
!
!
!
!
!
!
!
!
!
!
!              D   d
!              DDD d
!       d DD  DDDDDdd  d d  dd
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
.46 0.88 ALL    11 0.71 0.13
       OVERALL 20 0.86 0.28

ERED VALUES FOLLOW:

38d 0.46D 0.51D 0.65D 0.70D 0.72D 0.72D 0.75D 0.77D 0.84D 0.84D 0.87D 0.90d
93d 0.94d 0.98d 1.10d 1.24d 1.37d 1.44d
```

```
# B 5637  1680.0M 7121/7-1
|
|
|
|
|
|
|
|
|
|
|
|           D
|           D
|        d  DDD
|       dd DDDDD  ddddd
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
.55 0.76 ALL   10 0.66 0.06
       OVERALL 18 0.72 0.21

ERED VALUES FOLLOW:

.41d 0.45d 0.47d 0.55D 0.62D 0.62D 0.63D 0.64D 0.65D 0.68D 0.70D 0.73D 0.75D
91d 0.97d 1.01d 1.07d 1.12d
```

```
|
|
|
|
|
|
|
|
|
|
|
|
|              D
|             DD
|         dd DDDD dd   d
-+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

LOW HIGH LIT #VAL MEAN STDV
.57 0.74 ALL     7 0.64 0.05
       OVERALL 12 0.68 0.18

ERED VALUES FOLLOW:

43d 0.49d 0.57D 0.60D 0.60D 0.65D 0.65D 0.68D 0.73D 0.83d 0.88d 1.09d
```

```
# B 5653  1847.OM 7121/7-1
 |
-|
 |
-|
 |
-|
 |
-|
 |
-|
 |
-|
 |         D        d
-|         DDD  d d d
 |       d DDDD ddddddd
-+----+----+----+----+----+----+----+----+----+----+---
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

 LOW HIGH LIT #VAL MEAN STDV
).50 0.66 ALL    8 0.57 0.06
       OVERALL 20 0.75 0.20

)ERED VALUES FOLLOW:

.40d 0.50D 0.52D 0.53D 0.56D 0.57D 0.63D 0.64D 0.65D 0.75d 0.79d 0.81d 0.87d
.89d 0.93d 0.95d 0.97d 0.99d 1.01d 1.09d
```

```
|
|
|
|
|
|
|
|
|
|
|
|                 N
|          nn   NNNN        n
|         nnnn NNNN n    n n n
-+----+----+----+----+----+----+----+----+----+----+---
0,00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
```

```
LOW HIGH LIT #VAL MEAN STDV
.43 0.57 ALL     6 0.50 0.05
.65 0.85 ALL     9 0.74 0.07
      OVERALL 20 0.77 0.27
```

ERED VALUES FOLLOW:

43n 0.47n 0.49n 0.52n 0.53n 0.56n 0.65N 0.67N 0.68N 0.73N 0.73N 0.75N 0.78N
82N 0.84N 0.90n 1.13n 1.21n 1.24n 1.34n

```
# B 5661  2135.OM 7121/7-1
|
|
|
|
|
|
|
|                        j       j    j
-+----+----+----+----+----+----+----+----+----+----+---
).00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50

.OW HIGH LIT #VAL MEAN STDV
      OVERALL   3 1.33 0.32

:RED VALUES FOLLOW:

)0j 1.36j 1.63j
```